PROJECT MANUAL

ACCESSIBILITY UPGRADES PROJECT AT UNITS C & D at REDWOOD SCHOOL

3555 WILMARTH ROAD – STOCKTON, CA 95215

Project Tracking Number: 10397-43
DSA File Number: 39-89
DSA Application #: 02-121622
BID NUMBER: 2021/22-008-059-059002/3
2022-05

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OPERATIONS & SUPPORT SERVICES DEPARTMENT
2707 TRANSWORLD DRIVE, STOCKTON, CA 95206

ARCHITECHNICA

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ACCESSIBILITY UPGRADES PROJECT AT

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IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-121622 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 3/12/2024

SIGNATURE PAGE

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Bid No.: 2021/22-008-059-059002/3

DOCUMENT 00 01 10

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DOCUMENT 01 11 00 - SUMMARY OF WORK

1. GENERAL

1.1. RELATED DOCUMENTS AND PROVISIONS

Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Documents, apply to this Document.

1.2. SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

The Work may consist of the following:

1.2.1. Accessibility upgrades at Two existing Classroom Buildings, Units C & D, to replace existing concrete walks and asphalt paving; modifications to existing exterior doors to add electrically powered door operators, and minor interior modifications to existing restrooms and classrooms to remove architectural barriers.

1.3. CONTRACTS

Perform the Work under a single, fixed-price Contract.

1.4. SPECIAL PROJECT REQUIREMENTS

1.4.1 When school is in session, construction work at Unit “C” shall be limited to outdoor activities. The contractor can work on the covered walk, replace the sidewalks, conduct earth moving activities, site utility work, and asphalt paving replacement.

1.5. WORK BY OTHERS

1.5.1. Work on the Project that will be performed and completed prior to the start of the Work of this Contract.

1.6. CODES, REGULATIONS AND STANDARDS

1.6.1. The codes, regulations, and standards adopted by the State and federal agencies having jurisdiction shall govern minimum requirements for the Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.

1.6.2. Codes, regulations, and standards are as published effective as of date of bid opening, unless otherwise specified or indicated.

1.7. EXAMINATION OF EXISTING CONDITIONS

1.7.1. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets and roads approaching the Site.

1.7.2. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.

1.7.3. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.8. CONTRACTOR'S USE OF PREMISES

1.8.1. Contractor shall take all reasonable precautions for the safety of the students and the school employees throughout the duration of the Project.

1.8.2. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.

1.8.3. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor, at no expense to District.

1.8.4. Contractor shall not interfere with others use of or access to occupied portions of the building(s) or adjacent property.

1.8.5. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.

1.8.6. No one other than those directly involved in the demolition and construction or specifically designated by the District or the Architect shall be permitted in the areas of Work during demolition and construction activities.

1.9. PROTECTION OF EXISTING STRUCTURES AND UTILITIES

1.9.1. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.

1.9.2. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.10. UTILITY SHUTDOWNS AND INTERRUPTIONS

1.10.1. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.

1.10.2. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.11. STRUCTURAL INTEGRITY

1.11.1. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.

1.11.2. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

END OF DOCUMENT

SECTION 01 25 00 – SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.

B. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.

1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.

a. Unavailability.

b. Regulatory changes.

2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.

2. Agrees to provide the same warranty for the substitution as for the specified product.

3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.

4. Waives claims for additional costs or time extension that may subsequently become apparent.

5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

1. Note explicitly any non-compliant characteristics.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.

1. No specific form is required. Contractor's Substitution Request documentation must include the following:

a. Project Information:

1) Official project name and number, and any additional required identifiers established in Contract Documents.

2) Owner's, Architect's, and Contractor's names.

b. Substitution Request Information:

1) Discrete and consecutive Substitution Request number, and descriptive subject/title.

2) Indication of whether the substitution is for cause or convenience.

3) Issue date.

4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).

5) Description of Substitution.

6) Reason why the specified item cannot be provided.

7) Differences between proposed substitution and specified item.

8) Description of how proposed substitution affects other parts of work.

c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:

1) Physical characteristics.

2) In-service performance.

3) Expected durability.

4) Visual effect.

5) Warranties.

6) Other salient features and requirements.

7) Include, as appropriate or requested, the following types of documentation:

(a) Product Data:

(b) Certificates, test, reports or similar qualification data.

(c) Drawings, when required to show impact on adjacent construction elements.

d. Impact of Substitution:

1) Savings to Owner for accepting substitution.

2) Change to Contract Time due to accepting substitution.

D. Limit each request to a single proposed substitution item.

1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:

1. Owner will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Architect will consider requests for substitutions only within 15 days after date of Agreement.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:
    a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.

D. Substitutions will not be considered under one or more of the following circumstances:
1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.

3.04 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.
1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION

SECTION 01 30 00 – ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Preconstruction meeting.

C. Progress meetings.

D. Construction progress schedule.

E. Submittals for review, information, and project closeout.

F. Number of copies of submittals.

G. Requests for Interpretation (RFI) procedures.

H. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 60 00 - Product Requirements: General product requirements.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect:

1. Requests for Interpretation (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:

1. Owner.
2. Architect.
3. Contractor.
4. Project Inspector

C. Agenda:

1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.

3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract, Project Inspector, and Architect.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

3.02 PROGRESS MEETINGS

A. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

B. Attendance Required:

1. Contractor.
2. Owner.
3. Architect.
4. Project Inspector
5. Contractor's superintendent.
6. Major subcontractors.

C. Agenda:

1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to work.

3.03 CONSTRUCTION PROGRESS SCHEDULE

A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

C. Within 10 days after joint review, submit complete schedule.

D. Submit updated schedule with each Application for Payment.

3.04 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:

1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.

2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.

a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.

b. Do not forward requests which solely require internal coordination between subcontractors.

2. Prepare in a format and with content acceptable to Owner.

3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.

1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.

2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:

a. Approval of submittals (use procedures specified elsewhere in this section).

b. Approval of substitutions (see Section – 01 60 00 - Product Requirements)

3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.

a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

1. Official Project name and number, and any additional required identifiers established in Contract Documents.

2. Owner's, Architect's, and Contractor's names.

3. Discrete and consecutive RFI number, and descriptive subject/title.

4. Issue date, and requested reply date.

5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.

1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Note dates of when each request is made, and when a response is received.
3. Highlight items requiring priority or expedited response.
4. Highlight items for which a timely response has not been received to date.
5. Identify and include improper or frivolous RFIs.

H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.

1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.05 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:

1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Extra Copies at Project Closeout: See Section 01 78 00.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.

1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

A. General Requirements:

1. Use a single transmittal for related items.
2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and

coordination of information is in accordance with the requirements of the work and Contract Documents.

a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.

5. Schedule submittals to expedite the Project, and coordinate submission of related items.

a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.

c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.

6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.

7. Provide space for Contractor and Architect review stamps.

8. When revised for resubmission, identify all changes made since previous submission.

9. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

10. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

11. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:

1. Submit only information required by individual specification sections.

2. Collect required information into a single submittal.

3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.

2. Do not reproduce Contract Documents to create shop drawings.

3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:

1. Transmit related items together as single package.

2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.10 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect's and consultants' actions on items submitted for review:

1. Authorizing purchasing, fabrication, delivery, and installation:

a. "Approved", or language with same legal meaning.

b. "Approved as Noted, Resubmission not required", or language with same legal meaning.

1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.

c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.

2. Not Authorizing fabrication, delivery, and installation:

E. Architect's and consultants' actions on items submitted for information:

1. Items for which no action was taken:

a. "Received" - to notify the Contractor that the submittal has been received for record only.

2. Items for which action was taken:

a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

DOCUMENT 01 45 29 - CONSTRUCTION OBSERVATION, INSPECTION, AND TESTING

1. GENERAL

1.1. RELATED DOCUMENTS AND PROVISION

Contractor shall review all Contract Documents for applicable provisions related to the provisions in this document, including without limitation:

1.1.1. General Conditions, including “Tests and Inspections”; and

1.1.2. Special Conditions (if any);

1.1.3. Supplemental Conditions (if any).

1.2. DOCUMENT INCLUDES

1.2.1. Observation and Supervision.

1.2.2. Testing Laboratories and Agencies

1.2.3. Tests and Inspections

1.2.4. Selection and Payment

1.2.5. District's Testing Laboratory Responsibilities

1.2.6. Laboratory reports.

1.2.7. Limits on testing laboratory authority.

1.2.8. Contractor responsibilities.

1.2.9. Schedule of inspections and tests.

1.2.10. Project Inspector’s Access to Site and Plant

1.3. REFERENCES

1.3.1. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.3.2. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

1.3.3. The work is governed by the requirements of the 2022 edition of Title 24, California Code of Regulations (CCR), parts 1, 2, 3, 4, 5, 6, 9, and 11. A copy of the 2022 edition of Title 24, CCR, parts 1, 2, 3, 4, and 5 shall be kept and maintained at the jobsite for ready reference during construction at all times in accordance with Title 24, Part 1, § 4-342(b)3.

1.3.4. CAC – California Administrative Code, 2022 edition of Title 24, CCR, Part 1.

1.3.5. DSA - Division of the State Architect. DSA shall be notified before the start of construction by the Architect of Record with Form DSA 102-IC.

1.3.6. Addenda – All addenda must be signed by the Architect in General Responsible Charge and approved by the Division of the State Architect (DSA) in accordance with Title 24, CCR, Part 1, § 4-338(b).

1.4. OBSERVATION AND SUPERVISION

1.4.1. The District and Architect or their appointed representatives as well as the Building Manufacturer's Architect and/or Structural Engineer (Delegated by the Architect of Record and listed on DSA Form 1-MR) will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect any consulting Structural Engineer, and delegated Architect/Structural Engineer will be in accordance with applicable regulations, including, without limitation, Title 24, CCR, Part 1, § 4-341.

1.4.2. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District ("Project Inspector"), will observe the Work in accordance with Title 24, CCR, Part 1, §§ 4-333(b) and 4-342:

1.4.3. Project Inspector shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. Contractor shall provide facilities and access as required and shall provide assistance for sampling or measuring materials.

1.4.3.1. Project Inspector will notify District and Architect and inform Contractor of any observed failure of Work or material to conform to Contract Documents.

1.4.3.2. The Project Inspector shall observe and monitor all testing and inspection activities required.

1.4.4. Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the DSA approved documents wherein the finished work will not comply with Title 24, CCR, a Construction Change Document, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work.

1.4.5. Changes to the structural, accessibility, and fire and life-safety portions of the approved plans and specifications after the work has been let shall be made by a Construction Change Document as required in Title 24, CCR, Part 1, § 4-338 and shall be submitted to and approved by DSA prior to commencement of the work. Construction Change Documents shall be prepared and submitted to DSA in compliance with DSA Interpretation of Regulation IR A-6.

1.4.6. All change order, CCDs (Construction Change Documents (Category A and Category B)), Proposal Requests, and Architect's Supplemental Instructions (ASI) shall be signed by the Architect in General Responsible Charge, District (changer orders only), structural engineer (when applicable), delegated architect/professional engineer (when applicable) and approved by DSA (when applicable per the requirements of IR A-6) in accordance with Title 24, CCR, Part 1, §§ 4-338 (c) and (d).

1.4.7. Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to Title 24, CCR, Part 1 § 4-343. Contractor shall supervise and direct the Work and maintain a competent superintendent on the Project who is authorized to act in all matters pertaining to the Work. The Contractor shall inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Title 24, CCR, Part 1, § 4-336.

1.5. TESTING LABORATORIES AND AGENCIES

1.5.1. Testing agencies and tests shall be in conformance with the Contract Documents and the requirements of Title 24, CCR, Part 1, § 4-335.

1.5.2. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer ("Soils Engineer").

1.5.3. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory ("Testing Laboratory" or "Laboratory"). The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.6. TESTS AND INSPECTIONS

1.6.1. Contractor shall be responsible for notifying District and Project Inspector of all required tests and inspections. Contractor shall notify District and Project Inspector forty-eight (48) hours in advance of performing any Work requiring testing or inspection.

1.6.2. Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.

1.6.3. District will pay for first inspections and tests required by the Title 24 and other inspections or tests that District and/or Architect may direct to have made, including, but not limited to, the following principal items:

1.6.3.1. Tests and observations for earthwork and paving.

1.6.3.2. Tests for concrete mix designs, including tests of trial batches.

1.6.3.3. Tests and inspections for structural steel work.

1.6.3.4. Field tests for framing lumber moisture content.

1.6.3.5. Additional tests directed by District that establish that materials and installation comply with the Contract Documents.

1.6.3.6. Test and observation of welding and expansion anchors.

1.6.3.7. Factory observation of components and assembly of modular prefabrication structures and buildings.

1.6.4. District may at its discretion, pay and back charge Contractor for:

1.6.4.1. Retests or reinspections, if required, and tests or inspection required due to Contractor error or lack of required identifications of material.

1.6.4.2. Uncovering of work in accordance with Contract Documents.

1.6.4.3. Testing done on weekends, holidays, and overtime will be chargeable to Contractor for the overtime portion.

1.6.4.4. Testing done off site.

1.6.5. Testing and inspection reports and certifications:

1.6.5.1. If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification: District; Architect; Consulting Engineer, if any; Other Engineers on the Project, as appropriate; and; Project Inspector.

1.6.5.2. When the test or inspection is one required by the Title 24, a copy of the report shall also be provided to the DSA.

1.7. SELECTION AND PAYMENT

1.7.1. District will hire and pay for services of an independent Testing Laboratory to perform specified inspection and testing as specified by District's Testing Laboratory.

1.7.2. District’s hiring of Testing Laboratory shall in no way relieve Contractor of its obligation to perform work in accordance with requirements of Contract Documents.

1.8. DISTRICT'S TESTING LABORATORY RESPONSIBILITIES

1.8.1. Test samples of mixes submitted by Inspector.

1.8.2. Perform specified inspection, sampling, and testing of Products in accordance with specified standards.

1.8.3. Notify Architect and Contractor of observed irregularities or non-conformance of Work or Products.

1.8.4. Attend preconstruction conferences and progress meetings when requested by Architect.

1.9. LABORATORY REPORTS

1.9.1. After each inspection and test, District shall then submit one copy of laboratory report to Contractor. Reports of test results of materials and inspections found not to be in compliance with the requirements of the Contract Documents shall be forwarded immediately.

1.9.2. Each Testing Laboratory shall submit a verified report covering all of the tests which were required to be made by that agency during the progress of the

Project. Such report shall be furnished each time that Work is suspended, covering the tests up to that time and at the Completion of the Project, covering all tests.

1.10. LIMITS ON TESTING LABORATORY AUTHORITY

1.10.1. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

1.10.2. Laboratory may not approve or accept any portion of the Work.

1.10.3. Laboratory may not assume any duties of Contractor.

1.10.4. Laboratory has no authority to stop the Work.

1.11. CONTRACTOR RESPONSIBILITIES

1.11.1. Submit proposed items for testing as required herein and/or as further required in the Contract Documents to Architect for review in accordance with applicable specifications.

1.11.2. Cooperate with Laboratory personnel, and provide access to the Work and to manufacturer's facilities.

1.11.3. Notify Architect, District, and Testing Laboratory 48 hours prior to expected time for operations requiring inspection and testing services.

1.11.4. When tests or inspections cannot be performed after such notice, reimburse District for Laboratory personnel and travel expenses incurred due to the Contractor's negligence.

1.11.5. Contractor shall notify District a sufficient time in advance of the manufacture of material to be supplied by Contractor pursuant to the Contract Documents, which must by terms of the Contract be tested, in order that the District may arrange for the testing of same at the source of supply.

1.11.5.1. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice that such testing and inspection will not be required shall not be incorporated in the Work.

1.11.6. Contract and pay for services of District's Testing Laboratory to perform additional inspections, sampling and testing required when initial tests indicate Contractor's work and/or materials does not comply with Contract Documents.

1.12. SCHEDULE OF INSPECTIONS AND TESTS

The Testing Laboratory shall perform tests and inspections noted on Form DSA-103, List of Required Structural Tests & Special Inspections included at the end of this document with additional information included in each specification section as needed.

1.12.1. **Plumbing**

Testing as specified in Division 22 including, but not limited to: Sterilization, soil waste and vent, water piping, source of water, gas piping, downspouts and storm drains.

1.12.2. **Automatic Fire Sprinklers (where applicable)**

Testing as specified in Division 21 shall include, but not be limited to: hydrostatic pressure.

1.12.3. **Heating, Ventilating and Air Conditioning**

Testing as specified in Division 23 shall include, but not be limited to: Ductwork tests, cooling tower tests, boiler tests, controls testing, piping tests, water and air systems, and test and balance of heating and air conditioning systems.

1.12.4. **Electrical**

Testing as specified in Division 26, including, but not limited to: Equipment testing, all electrical system operations, grounding system and checking insulation after cable is pulled.

1.12.5. **Fire Alarm (where applicable)**

Testing as specified in Division 28.

1.13. **PROJECT INSPECTOR'S ACCESS TO SITE**

1.13.1. A Project Inspector employed by the District in accordance with the requirement of State of California Code of Regulations, Title 24, Part 1 will be assigned to the Work. Project Inspector's duties are specifically defined in 24. C.C.R. §4-342, and as indicated in the General Conditions.

1.13.2. District and Architect shall at all times have access for the purpose of inspection to all parts of the Work and to the shops wherein the Work is in preparation, and Contractor shall at all times maintain proper facilities and provide safe access for such inspection.

1.13.3. The Work in all stages of progress shall be subject to the personal continuous observation of the Inspector. Inspector shall have free access to any or all parts of the Work at any time. Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep Inspector fully informed respecting the progress and manner of the Work and the character of the materials. Inspection of the Work shall not relieve the Contractor from any obligation set forth in the Contract Documents.

1.13.4. The Inspector is not authorized to change, revoke, alter, enlarge or decrease in any way any requirement of the Contract Documents, drawings, specifications or subsequent change orders.

1.13.5. Whenever there is insufficient evidence of compliance with any of the provisions of Title 24 or evidence that any material or construction does not conform to the requirements of Title 24, the Division of the State Architect may require tests as proof of compliance. Test methods shall be as specified herein or by other recognized and accepted test methods determined by the Division of the State

Architect. All tests shall be performed by a testing laboratory accepted by the Division of the State Architect.

END OF DOCUMENT

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS, 2022 CBC

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IMPORTANT: This form is only a summary list of structural tests and some of the special inspections required for the project. Generally, the structural tests and special inspections noted on this form are those that will be performed by the Geotechnical Engineer of Record, Laboratory of Record, or Special Inspector. The actual complete test and inspection program must be performed as detailed on the DSA approved documents. The appendix at the bottom of this form identifies work NOT subject to DSA requirements for special inspection or structural testing. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A (2022 CBC).

****NOTE:** Undefined section and table references found in this document are from the CBC, or California Building Code.

KEY TO COLUMNS

1. TYPE	2. PERFORMED BY
Continuous – Indicates that a continuous special inspection is required **Periodic** – Indicates that a periodic special inspection is required **Test** – Indicates that a test is required	**GE (Geotechnical Engineer)** – Indicates that the special inspection shall be performed by a registered geotechnical engineer or his or her authorized representative. **LOR (Laboratory of Record)** – Indicates that the test or special inspection shall be performed by a testing laboratory accepted in the DSA Laboratory Evaluation and Acceptance (LEA) Program. See CAC Section 4-335. **PI (Project Inspector) –** Indicates that the special inspection may be performed by a project inspector when specifically approved by DSA. **SI (Special Inspection)** – Indicates that the special inspection shall be performed by an appropriately qualified/approved special inspector.

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2022 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

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Geotechnical Reports: Project does NOT have and does NOT require a geotechnical report

	S1. GENERAL:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify that: • Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations. • Foundation excavations are extended to proper depth and have reached proper material. • Materials below footings are adequate to achieve the design bearing capacity.	**See Notes**	**PI**	Refer to specific items identified in the Appendix listing exemptions for limitations. Placement of controlled fill exceeding 12" depth under foundations is not permitted without a geotechnical report.

	S2. SOIL COMPACTION AND FILL:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify use of proper materials, densities and inspect lift thicknesses, placement and compaction during placement of fill.	**Continuous**	**LOR***	* Under the supervision of a geotechnical engineer or LOR's engineering manager. Refer to specific items identified in the Appendix listing exemptions for limitations.
☑	**b.** Compaction testing.	**Test**	**LOR***	* Under the supervision of a geotechnical engineer or LOR's engineering manager. Refer to specific items identified in the Appendix listing exemptions for limitations.

	S3. DRIVEN DEEP FOUNDATIONS (PILES):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify pile materials, sizes and lengths comply with the requirements.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**b.** Determine capacities of test piles and conduct additional load tests as required.	**Test**	**LOR***	* Under the supervision of the geotechnical engineer.

	Test or Special Inspection	Type	Performed By	Code References and Notes
☐	**c.** Inspect driving operations and maintain complete and accurate records for each pile.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**d.** Verify locations of piles and their plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and record any pile damage.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**e.** Steel piles.	Provide tests and inspections per STEEL section below.		
☐	**f.** Concrete piles and concrete filled piles.	Provide tests and inspections per CONCRETE section below.		
☐	**g.** For specialty piles, perform additional inspections as determined by the registered design professional in responsible charge.	*	*	* As defined on drawings or specifications.

	S4. CAST-IN-PLACE DEEP FOUNDATIONS (PIERS):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Note**
☐	**a.** Inspect drilling operations and maintain complete and accurate records for each pier.	**Continuous**	**PI**	Continuous inspection to be provided by project inspector. Refer to specific items identified in the Appendix listing exemptions for limitations.
☐	**b.** Verify pier locations, diameters, plumbness and lengths.Record concrete or grout volumes.	**Continuous**	**PI**	Continuous inspection to be provided by project inspector. Refer to specific items identified in the Appendix listing exemptions for limitations.
☐	**c.** Concrete piers.	Provide tests and inspections per CONCRETE section below.		

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Table 1705A.6, Table 1705A.7, Table 1705A.8

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	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
	S5. RETAINING WALLS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Placement, compaction and inspection of backfill.	**Continuous**	**GE***	**1705A.6.1.** * By geotechnical engineer or his or her qualified representative. (See section S2 above).
☐	**b.** Placement of soil reinforcement and/or drainage devices.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**c.** Segmental retaining walls; inspect placement of units, dowels, connectors, etc.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. See DSA IR 18-2.
☐	**d.** Concrete retaining walls.	Provide tests and inspections per CONCRETE section below.		
☐	**e.** Masonry retaining walls.	Provide tests and inspections per MASONRY section below.		

	S6. OTHER SOILS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Soil Improvements	**Test**	**GE***	Submit a comprehensive report documenting final soil improvements constructed, construction observation and the results of the confirmation testing and analysis to CGS (California Geological Survey) for final acceptance. * By geotechnical engineer or his or her qualified representative.
☐	**b.** Inspection of Soil Improvements	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**c.**			

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Table 1705A.3; ACI 318-19 Sections 26.12 & 26.13

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	C1. CAST-IN-PLACE CONCRETE			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify use of required design mix.	**Periodic**	**SI**	**Table 1705A.3 Item 5, 1910A.1.**
☑	**b.** Identifiy, sample, and test reinforcing steel.	**Test**	**LOR**	**1910A.2;** ACI 318-19 Ch.20 and Section 26.6.1.2; DSA IR 17-10. (See Appendix (end of this form) for exemptions.)
☑	**c.** During concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	**Test**	**LOR**	**Table 1705A.3 Item 6**; ACI 318-19 Sections 26.5 & 26.12.
☑	**d.** Test concrete (f'_c).	**Test**	**LOR**	**1905A.1.17;** ACI 318-19 Section 26.12.
☑	**e.** Batch plant inspection: **Periodic**	**See Notes**	**SI**	Default of **'Continuous'** per **1705A.3.3**. If approved by DSA, batch plant inspection may be reduced to **'Periodic'** subject to requirements in Section **1705A.3.3.1,** or eliminated per **1705A.3.3.2.** See IR 17-13. (See Appendix (end of this form) for exemptions.)
☐	**f.** Welding of reinforcing steel.	Provide special inspection per STEEL, Category S/A4(d) & (e) and/or S/A5(g) & (h) below.		

	C2. PRESTRESSED / POST-TENSIONED CONCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Sample and test prestressing tendons and anchorages.	**Test**	**LOR**	**1705A.3.4, 1910A.3**
☐	**b.** Inspect placement of prestressing tendons.	**Periodic**	**SI**	**1705A.3.4, Table 1705A.3 Items 1 & 9.**

	Test or Special Inspection	Type	Performed By	Code References and Notes
☐	**c.** Verify in-situ concrete strength prior to stressing of post-tensioning tendons.	**Periodic**	**SI**	**Table 1705A.3 Item 13.** Special inspector to verify specified concrete strength test prior to stressing.
☐	**d.** Inspect application of post-tensioning or prestressing forces and grouting of bonded prestressing tendons.	**Continuous**	**SI**	**1705A.3.4, Table 1705A.3 Item 9;** ACI 318-14 Section 26.13

	C3. PRECAST CONCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect fabrication of precast concrete members.	**Continuous**	**SI**	ACI 318-19 Section 26.13.
☐	**b.** Inspect erection of precast concrete members.	**Periodic**	**SI***	**Table 1705A.3 Item 10.** * May be performed by PI when specifically approved by DSA.
☐	**c.** For precast concrete diaphragm connections or reinforcement at joints classified as moderate or high deformability elements (MDE or HDE) in structures assigned to Seismic Design Category D, E or F, inspect such connections and reinforcement in the field for: 1. Installation of the embedded parts 2. Completion of the continuity of reinforcement across joints. 3. Completion of connections in the field.	**Continuous**	**SI**	Table 1705A.3; ACI 318-19 Section 26.13.1.3; ACI 550.5
☐	**d.** Inspect installation tolerances of precast concrete diaphragm connections for compliance with ACI 550.5.	**Periodic**	**SI**	Table 1705A.3; ACI 318-19 Section 26.13.1.3; ACI 550.5

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Table 1705A.3; ACI 318-19 Sections 26.12 & 26.13

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	C4. SHOTCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect shotcrete placement for proper application techniques.	**Continuous**	**SI**	**1705A.3.9, Table 1705A.3 Item 7, 1908A.1, 1908A.2, 1908A.3.** See ACI 506.2-13 Section 3.4, ACI 506R-16.
☐	**b.** Sample and test shotcrete (f'_c).	**Test**	**LOR**	**1908A.2, 1705A.3.9**

	C5. POST-INSTALLED ANCHORS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Inspect installation of post-installed anchors	**See Notes**	**SI***	**1617A.1.19, Table 1705A.3 Item 4a (Continuous) & 4b (Periodic), 1705A.3.8** (See Appendix (end of this form) for exemptions). ACI 318-14 Sections 17.8 & 26.13. * May be performed by the project inspector when specifically approved by DSA.
☑	**b.** Test post-installed anchors.	**Test**	**LOR**	**1910A.5.** (See Appendix (end of this form) for exemptions.)

	C6. OTHER CONCRETE:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (STEEL AND ALUMNINUM), 2022 CBC

1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	S/A1. STRUCTURAL STEEL, COLD-FORMED STEEL AND ALUMINUM USED FOR STRUCTURAL PURPOSES			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify identification of all materials and: • Mill certificates indicate material properties that comply with requirements. • Material sizes, types and grades comply with requirements.	**Periodic**	*	**Table 1705A.2.1 Item 3a–3c.** 2202A.1**;** AISI S100-20 Section A3.1 & A3.2, AISI S240-20 Section A3 & A5, AISI S220-20 Sections A4 & A6. * By special inspector or qualified technician when performed off-site.
☑	**b.** Test unidentified materials	**Test**	**LOR**	**2202A.1.**
☑	**c.** Examine seam welds of HSS shapes	**Periodic**	**SI**	DSA IR 17-3.
☑	**d.** Verify and document steel fabrication per DSA-approved construction documents.	**Periodic**	**SI**	Not applicable to cold-formed steel light-frame construction, except for trusses (**1705A.2.4**).
☐	**e.** Buckling restrained braces.	**Test**	**LOR**	Testing and special inspections in accordance with IR 22-4.

	S/A2. HIGH-STRENGTH BOLTS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify identification markings and manufacturer's certificates of compliance conform to ASTM standards specified in the DSA-approved documents.	**Periodic**	**SI**	**Table 1705A.2.1 Items 1a & 1b, 2202A.1;** AISC 360-16 Section A3.3, J3.1, and N3.2; RCSC 2014 Section 1.5 & 2.1; DSA IR 17-8 & DSA IR 17-9.
☐	**b.** Test high-strength bolts, nuts and washers.	**Test**	**LOR**	**Table 1705A.2.1 Item 1c, 2213A.1**; RCSC 2014 Section 7.2; DSA IR 17-8.
☐	**c.** Bearing-type ("snug tight") connections.	**Periodic**	**SI**	**Table 1705A.2.1 Item 2a, 1705A.2.6, 2204A.2**; AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Section 9.1; DSA IR 17-9.
☐	**d.** Pretensioned and slip-critical connections.	*	**SI**	**Table 1705A.2.1 Items 2b & 2c, 1705A.2.6, 2204A.2;** AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Sections 9.2 & 9.3; DSA IR 17-9. *"Continuous" or "Periodic" depends on the tightening method used.

	S/A3. WELDING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify weld filler material identification markings per AWS designation listed on the DSA-approved documents and the WPS.	**Periodic**	**SI**	**1705A.2.5, Table 1705A.2.1 Items 4 & 5**; AWS D1.1 and AWS D1.8 for structural steel; AWS D1.2 for Aluminum; AWS D1.3 for cold-formed steel; AWS D1.4 for reinforcing steel; DSA IR 17-3.
☑	**b.** Verify weld filler material manufacturer's certificate of compliance.	**Periodic**	**SI**	DSA IR 17-3.
☑	**c.** Verify WPS, welder qualifications and equipment.	**Periodic**	**SI**	DSA IR 17-3.

	S/A4. SHOP WELDING (IN ADDITION TO SECTION S/A3):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	**Continuous**	**SI**	**Table 1705A.2.1 Items 5a.1–4;** AISC 360-16 (and AISC 341-16 as applicable); DSA IR 17-3.
☑	**b.** Inspect single-pass fillet welds ≤ 5/16", floor and roof deck welds.	**Periodic**	**SI**	**1705A.2.2, Table 1705A.2.1 Items 5a.5 & 5a.6;** AISC 360-16 (and AISC 341-16 as applicable); DSA IR 17-3.
☑	**c.** Inspect welding of stairs and railing systems.	**Periodic**	**SI**	**1705A.2.1**; AISC 360-16 (and AISC 341-16 as applicable); AWS D1.1 & D1.3; DSA IR 17-3.
☐	**d.** Verification of reinforcing steel weldability other than ASTM A706.	**Periodic**	**SI**	**1705A.3.1**; AWS D1.4; DSA IR 17-3. Verify carbon equivalent reported on mill certificates.
☐	**e.** Inspect welding of reinforcing steel.	**Continuous**	**SI**	**Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8;** AWS D1.4; DSA IR 17-3.

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A5. FIELD WELDING (IN ADDITION TO SECTION S/A3):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	**Continuous**	**SI**	**Table 1705A.2.1 Items 5a.1–4;** AISC 360-16 (AISC 341-16 as applicable); DSA IR 17-3.
☑	**b.** Inspect single-pass fillet welds ≤ 5/16".	**Periodic**	**SI**	**Table 1705A.2.1 Item 5a.5;** AISC 360-16 (AISC 341-16 as applicable); DSA IR 17-3.
☐	**c.** Inspect end-welded studs (ASTM A-108) installation (including bend test).	**Periodic**	**SI**	**2213A.2**; AISC 360-16 (AISC 341-16 as applicable); AWS D1.1; DSA IR 17-3.
☐	**d.** Inspect floor and roof deck welds.	**Periodic**	**SI**	**1705A.2.2, Table 1705A.2.1 Item 5a.6;** AISC 360-16 (AISC 341-16 as applicable); AWS D1.3; DSA IR 17-3.
☐	**e.** Inspect welding of structural cold-formed steel.	**Periodic**	**SI***	**1705A.2.5; AWS D1.3; DSA IR 17-3.** The quality control provisions of AISI S240-20 Chapter D shall also apply. * May be performed by the project inspector when specifically approved by DSA.
☑	**f.** Inspect welding of stairs and railing systems.	**Periodic**	**SI***	**1705A.2.1;** AISC 360-16 (AISC 341-16 as applicable); AWS D1.1 & D1.3; DSA IR 17-3. * May be performed by the project inspector when specifically approved by DSA.
☐	**g.** Verification of reinforcing steel weldability.	**Periodic**	**SI**	**1705A.3.1**; AWS D1.4; DSA IR 17-3. Verify carbon equivalent reported on mill certificates.
☐	**h.** Inspect welding of reinforcing steel.	**Continuous**	**SI**	**Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8;** AWS D1.4; DSA IR 17-3.

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A6. NONDESTRUCTIVE TESTING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Ultrasonic	**Test**	**LOR**	**1705A.2.1, 1705A.2.5;** AISC 341-16 J6.2, AISC 360-16 N5.5; AWS D1.1, AWS D1.8; DSA IR 17-2.
☐	**b.** Magnetic Particle	**Test**	**LOR**	**1705A.2.1, 1705A.2.5;** AISC 341-16 J6.2, AISC 360-16 N5.5; AWS D1.1, AWS D1.8; DSA IR 17-2.
☐	**c.**	**Test**	**LOR**	

	S/A7. STEEL JOISTS AND TRUSSES:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify size, type and grade for all chord and web members as well as connectors and weld filler material; verify joist profile, dimensions and camber (if applicable); verify all weld locations, lengths and profiles; mark or tag each joist.	**Continuous**	**SI**	**1705A.2.3, Table 1705A.2.3;** AWS D1.1; DSA IR 22-3 for steel joists only. **1705A.2.4;** AWS D1.3 for cold-formed steel trusses.

	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A8. SPRAYED FIRE-RESISTANT MATERIALS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Examine structural steel surface conditions, inspect application, take samples, measure thickness and verify compliance of all aspects of application with DSA-approved documents.	**Periodic**	**SI**	**1705A.15, 1705A.1, 1705A.2, 1705A.3, 1705A.4.**
☐	**b.** Test density.	**Test**	**LOR**	**1705A.15.1, 1705A.15.5, ASTM E736**
☐	**c.** Bond strength adhesion/cohesion.	**Test**	**LOR**	**1705A.15.1, 1705A.15.4, ASTM E605**

	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A9. ANCHOR BOLTS AND ANCHOR RODS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Anchor Bolts and Anchor Rods	**Test**	**LOR**	Sample and test anchor bolts and anchor rods not readily identifiable per procedures noted in DSA IR 17-11.
☐	**b.** Threaded rod not used for foundation anchorage.	**Test**	**LOR**	Sample and test threaded rods not readily identifiable per procedures noted in DSA IR 17-11.

	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A10. STORAGE RACK SYSTEMS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Materials used, to verify compliance with one or more of the material test reports in accordance with the approved construction documents.	**Periodic**	**SI**	Table 1705A.13.7
☐	**b.** Fabricated storage rack elements.	**Periodic**	**SI**	1704A.2.5; Table 1705A.13.7

	Test or Special Inspection	Type	Performed By	Code References and Notes
☐	**c.** Storage rack anchorage installation.	**Periodic**	**SI**	ANSI/MH16.1 Section 7.3.2; Table 1705A.13.7
☐	**d.** Completed storage rack system to indicate compliance with the approved construction documents.	**Periodic**	**SI***	Table 1705A.13.7; * May be preformed by the project inspector when specifically approved by DSA.

	S/A11. Other Steel			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

Application Number:	School Name:	School District:
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Exempt items given in DSA IR A-22 or the 2019 CBC (including DSA amendments) and those items identified below with a check mark by the design professional are NOT subject to DSA requirements for the structural tests **/** special inspections noted. **Items marked as exempt shall be identified on the approved construction documents**. The project inspector shall verify all construction complies with the approved construction documents.

	SOILS:
☐	1. Deep foundations acting as a cantilever footing with a design based on minimum allowable pressures per CBC Table 1806A.2 and without a geotechnical report for the following cases: A) free standing sign or scoreboard, B) cell or antenna towers and poles less than 35'-0" tall (e.g., lighting poles, flag poles, poles supporting open mesh fences, etc.), C) single-story structure with dead load less than 5 psf (e.g., open fabric shade structure), or D) covered walkway structure with an apex height less than 10'-0" above adjacent grade.
☑	2. Shallow foundations, etc. are exempt from special inspections and testing by a Geotechnical Engineer for the following cases: A) buildings without a geotechnical report and meeting the exception item #1 criteria in CBC Section 1803A.2 supported by native soil (any excavation depth) or fill soil (not exceeding 12" depth per CBC Section 1804A.6), B) soil scarification/recompaction not exceeding 12" depth, C) native or fill soil supporting exterior non-structural flatwork (e.g., sidewalks, site concrete ramps, site stairs, parking lots, driveways, etc.), D) unpaved landscaping and playground areas, or E) utility trench backfill.

	CONCRETE/MASONRY:
☐	1. Post-installed anchors for the following: A) exempt non-structural components (e.g., mechanical, electrical, plumbing equipment - see item 7 for "Welding" in the Appendix below) given in CBC Section 1617A.1.18 (which replaces ASCE 7-16, Section 13.1.4) or B) interior nonstructural wall partitions meeting criteria listed in exempt item 3 for "Welding" in the Appendix below
☐	2. Concrete batch plant inspection is not required for items given in CBC Section 1705A.3.3.2 subject to the requirements and limitations in that section.
☐	3. Non-bearing non-shear masonry walls may be exempt from certain DSA masonry testing and special inspection items as allowed per DSA IR 21-1. Refer to construction documents for specific exemptions accordingly for each applicable wall condition.
☐	4. Epoxy shear dowels in site flatwork and/or other non-structural concrete.

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

Application Number:	School Name:	School District:
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	CONCRETE/MASONRY:
☐	5. Testing of reinforcing bars is not required for items given in CBC Section 1910A.2 subject to the requirements and limitations in that section.

	WELDING:
☐	1. Solid-clad and open-mesh fences, gates with maximum leaf span of 10', and gates with a maximum rolling section of 10' all having an apex height less than 8'-0" above lowest adjacent grade. When located above circulation or occupied space below, these gates/fences are not located within 1.5x gate/fence height (max 8'-0") to the edge of floor or roof.
☐	2. Handrails, guardrails, and modular or relocatable ramps associated with walking surfaces less than 30" above adjacent grade (excluding post base connections per the 'Exception' language in Section 1705A.2.1); fillet welds shall not be ground flush.
☐	3. Non-structural interior cold-formed steel framing spanning less than 15'-0", such as in interior partitions, interior soffits, etc. supporting only self weight and light-weight finishes or adhered tile, masonry, stone, or terra cotta veneer no more than 5/8" thickness and apex less than 20'-0" in height and not over an exit way. Maximum tributary load to a member shall not exceed the equivalent of that occurring from a 10'x10' opening in a 15' tall wall for a header or king stud.
☐	4. Manufactured support frames and curbs using hot rolled or cold-formed steel (i.e., light gauge) for mechanical, electrical, or plumbing equipment weighing less than 2000# (equipment only) (connections of such frames to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
☐	5. Manufactured components (e.g., Tolco, B-Line, Afcon, etc.) for mechanical, electrical, or plumbing hanger support and bracing (connections of such components to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
☐	6. TV Brackets, projector mounts with a valid listing (see DSA IR A-5) and recreational equipment (e.g., playground structures, basketball backstops, etc.) (connections of such elements to superstructure elements using welding will require special inspection as noted in selected item(s) for sections S/A3, S/A4 and/or S/A5 located in the Steel/Aluminum category of listing above).
☐	7. Any support for exempt non-structural components given in CBC Section 1617A.1.18 (which replaces ASCE 7-16, Section 13.1.4) meeting the following: A) when supported on a floor/roof, <400# and resulting composite center of mass (including component's center of mass) ≤4' above supporting floor/roof, B) when hung from a wall or roof/floor, <20# for discrete units or <5 plf for distributed systems.

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS(SIGNATURE), 2022 CBC

Application Number:
02-121622

School Name:
Redwood School

School District:
San Joaquin County Office of Education

DSA File Number:
39-89

Increment Number:

Date Created:
2023-08-25 11:02:48

Name of Architect or Engineer in general responsible charge:

Timothy L. Dearborn, AIA

Name of Structural Engineer (When structural design has been delegated):

William D. Bevier

Signature of Architect or Structural Engineer:

Date:
08/25/2023

Note: To facilitate DSA electronic mark-ups and identification stamp application, DSA recommends against using secured electronic or digital signatures.

DSA STAMP

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-121622 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 3/12/2024

DSA 103-22: LIST OF REQUIRED VERIFIED REPORTS, CBC 2022

Application Number:	School Name:	School District:
02-121622	Redwood School	San Joaquin County Office of Education
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1. Structural Testing and Inspection: Laboratory Verified Report Form DSA 291
2. Concrete Batch Plant Inspection: Laboratory Verified Report Form DSA 291
3. Post-installed Anchors: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
4. Shop Welding Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
5. Field Welding Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary sanitary facilities.

C. Temporary Controls: Barriers, enclosures, and fencing.

D. Security requirements.

E. Fire Protection.

F. Vehicular access and parking.

G. Waste removal facilities and services.

1.02 TEMPORARY UTILITIES - SEE SECTION 01 51 00

A. Owner will provide the following:

1. Electrical power and metering, consisting of connection to existing facilities.

2. Water supply, consisting of connection to existing facilities.

B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.03 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.04 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 FENCING

A. Provide 6-foot-high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.06 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.07 FIRE PROTECTION

A. Comply with California Fire Code Chapter 33 – Fire Safety During Construction and Demolition during the progress of the Work.

B. Contract shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California State Fire Marshal and/or its designee.

C. Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection of adjacent surfaces.

D. Supervise welding operations and other sources of fire ignition according to requirements of authorities having jurisdiction.

1.08 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.09 WASTE REMOVAL

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 51 00 – TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Provision of electricity and water.

1.02 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls:

1. Temporary sanitary facilities required by law.

1.03 TEMPORARY ELECTRICITY

A. Cost: By Owner.

B. Connect to Owner's existing power service.

1. Do not disrupt Owner's need for continuous service.

2. Exercise measures to conserve energy.

C. Provide temporary electric feeder from existing building electrical service at location as directed.

D. Power Service Characteristics: 120/208-volt, 125 ampere, three phase, four wire.

E. Complement existing power service capacity and characteristics as required.

F. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

G. Provide main service disconnect and over-current protection at convenient location and meter.

H. Permanent convenience receptacles may not be utilized during construction.

I. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Owner.

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

C. Connect to existing water source.

1. Exercise measures to conserve water.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:

1. Containing lead, cadmium, or asbestos.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

F. For exterior storage of fabricated products, place on sloped supports above ground.

G. Provide off-site storage and protection when site does not permit on-site storage or protection.

H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

I. Comply with manufacturer's warranty conditions, if any.

J. Do not store products directly on the ground.

K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

M. Prevent contact with material that may cause corrosion, discoloration, or staining.

N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 70 00 – EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Cutting and patching.

C. Surveying for laying out the work.

D. Cleaning and protection.

E. Starting of systems and equipment.

F. Demonstration and instruction of Owner personnel.

G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures.

B. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

1.03 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

1.04 PROJECT CONDITIONS

A. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

B. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

1. Minimize amount of bare soil exposed at one time.

2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.

C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.05 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. Coordinate completion and clean-up of work of separate sections.

F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

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

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

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and equipment pads.

2. Grid or axis for structures.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:

1. Complete the work.

2. Fit products together to integrate with other work.

3. Provide openings for penetration of mechanical, electrical, and other services.

4. Match work that has been cut to adjacent work.

5. Repair areas adjacent to cuts to required condition.

6. Repair new work damaged by subsequent work.

7. Remove samples of installed work for testing when requested.

8. Remove and replace defective and non-complying work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. Patching:

1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

2. Match color, texture, and appearance.

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

3.06 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.07 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and Owner seven days prior to start-up of each item.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.09 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

D. Clean site; sweep paved areas, rake clean landscaped surfaces.

E. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide copies to Architect and Owner.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT & DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

E. Methods of trash/waste disposal that are not acceptable are:

1. Burning on the project site.
2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.

F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.

2. Submit Report on a form acceptable to Owner.

3. Landfill Disposal: Include the following information:

a. Identification of material.

b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.

c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

4. Incinerator Disposal: Include the following information:

a. Identification of material.

b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project delivered to incinerators.

c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

5. Recycled and Salvaged Materials: Include the following information for each:

a. Identification of material, including those retrieved by installer for use on other projects.

b. Amount, in tons or cubic yards (cubic meters), date removed from the project site, and receiving party.

c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

6. Material Reused on Project: Include the following information for each:

a. Identification of material and how it was used in the project.

b. Amount, in tons or cubic yards (cubic meters).

c. Include weight tickets as evidence of quantity.

7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

A. See Section 01 60 00 - Product Requirements for substitution submission procedures.

B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00:

1. Relative amount of waste produced, compared to specified product.
2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Price.
3. Proposed disposal method for waste product.
4. Markets for recycled waste product.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.

1. Prebid meeting.
2. Preconstruction meeting.
3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. Provide containers as required.
2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 78 00 – CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:

1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.

2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.

3. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.

2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications to the Contract.

5. Reviewed shop drawings, product data, and samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:

1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Include manufacturer's printed operation and maintenance instructions.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:

1. Project Directory.
2. Table of Contents, of all volumes, and of this volume.
3. Operation and Maintenance Data: Arranged by system, then by product category.
    a. Source data.
    b. Operation and maintenance data.
    c. Field quality control data.
    d. Photocopies of warranties and bonds.

3.05 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 02 41 19 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:
1. Section 01 11 00 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 01 70 00 "Execution and Closeout Requirements" for cutting and patching procedures.
3. Section 01 74 19 “Construction Waste Management and Disposal” for administrative and procedural requirements for disposal of demolition waste.
4. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREDEMOLITION CONFERENCE

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

1.6 SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

E. Predemolition Photographs or Video: Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

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

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

A. Owner will occupy buildings immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in buildings to receive selective demolition. A report on the presence of hazardous materials is included for review and use. Examine report to become aware of locations where hazardous materials are present.
   1. Hazardous material remediation shall be handled as part of this contract. Hazardous materials shall be handled and disposed of as required by applicable law.
   2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
   2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs and/or video.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
      a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
      b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
      c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
      d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
      e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
      f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
      g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection specified in Section 01 50 00 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."

B. Removed and Salvaged Items:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's storage area designated by Owner.
   5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Pack or crate items after cleaning and repairing. Identify contents of containers.
   3. Protect items from damage during transport and storage.
   4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 07 51 13 “Built-up Asphalt Roofing” for new roofing requirements.
   1. Remove existing roof membrane, flashings, copings, and roof accessories.
   2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION 02 41 19

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, and placement procedures, for the following:

1. Footings.

B. Related Sections:

1. Section 32 13 13 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, staining materials, and others as requested by the Architect.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Drawings that detail fabrication, bending, and placement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Include special reinforcement required and openings through concrete structures.

D. Qualification Data: For Installer and Design Mixture Engineer (California Registered Civil or Structural Engineer).

E. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design tests as specified.

F. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by the Architect. Material certificates shall be signed by manufacturers and contractor, certifying that each material item complies with, or exceeds specified requirements:

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified.

1. 2022 California Building Code – CCR Title 24, Part 2.
2. ACI 301 "Specifications for Structural Concrete for Buildings." A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under CBC Section 1905A.2 and testing shall be performed in a laboratory acceptable to the enforcement agency.
3. ACI 318 "Building Code Requirements for Reinforced Concrete."
4. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."

D. Concrete Testing Service: The Owner shall employ a testing laboratory acceptable to the Architect and DSA to perform material evaluation tests. Design of concrete mixes shall be by a registered civil engineer retained by the Contractor.

E. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including re-testing of rejected materials and installed work, shall be paid by Owner, but back charged to the Contractor.

F. Testing shall be performed per Section 3.7 of these Specifications and CCR Title 24, Chapter 19A.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60, deformed, #4 and larger. For #3 use Grade 40.

B. Weldable Steel Reinforcing Bars: ASTM A706, deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A706, deformed.

D. Plain-Steel Wire: ASTM A82, plain, cold-drawn, steel.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type II (low alkali) unless otherwise acceptable to Architect, gray

B. Normal-Weight Aggregates: ASTM C33, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source. Other aggregates which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect and DSA.

1. Maximum Coarse-Aggregate Size: 1 1/2 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Concrete Sand: ASTM C33. Provide concrete sand from a single source.

D. Water: ASTM C94 and potable.

E. Calcium Chloride not permitted.

F. Air-Entraining Admixture: ASTM C 260.

G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride are admixtures containing calcium chloride.

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.5 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, as specified in ACI 301 and Chapter 5 of ACI 318.

1. Use a qualified independent testing agency, acceptable to Architect, for preparing and reporting proposed mixture designs based on laboratory trial mixtures. The testing shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.

2. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.

B. Adjustment to Concrete Mixes: Mix design adjustment may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and approved by Architect before using in work.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

2.6 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Reinforced Foundation Systems: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.58.
3. Slump Limit: Not less than 3" and not more than 5".
4. Air Content: Plus or minus 1.5 percent at point of delivery for 1.5-inch nominal maximum aggregate size.

2.7 FABRICATING REINFORCEMENT

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

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94, and furnish batch ticket information.

1. Delete references for allowing additional water to be added to batch for material with sufficient slump. Addition of water to the batch will not be permitted.
2. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
3. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.2 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 CONCRETE PLACEMENT

A. Preplacement Inspection, Notification: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Notify Architect, Project Inspector, and DSA by email 48 hours in advance of placement. Moisten wood forms immediately before placing concrete where form coatings are not used.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

E. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas. Do not wet round concrete column forms.

3.4 MISCELLANEOUS CONCRETE ITEMS

A. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.5 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h.

C. Cure concrete according to ACI 308.1, by one or a combination of the following method:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

3.6 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

D. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.7 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing laboratory to perform field tests and prepare test reports. Refer to the DSA-103 Structural Tests and Inspections Form at the end of Section 01 45 29 – Construction Observation, Inspection, and Testing

B. Waiver of Batch Plant Inspection: Batch plant inspection may be waived under the following condition:

1. The concrete plan complies fully with the requirements of ASTM C94, Sections 8 and 9, and has a current certificate from the National Ready Mixed Concrete Association or another agency acceptable to DSA. The certification shall indicate that the plant has automatic batching and recording capabilities.
2. When batch plant inspection is waived the following requirements shall apply:

    a. An approved inspector of the testing laboratory shall check the first batching at the start of work and furnish mix proportions to the licensed weighmaster.
    b. The licensed weighmaster shall positively identify materials as to quantity and certify each load by a ticket.
    c. The ticket shall be transmitted to the project inspector by a truck driver with load identified thereon. The inspector will not accept the load without a load ticket identifying the mix. The inspector will keep a daily record of placements, identifying each truck, its load and time of receipt, and approximate location of deposit in the structure. The inspector will transmit a copy of the daily record to DSA.
    d. At the end of the project, the weighmaster shall furnish an affidavit to DSA on form SSS 411-8 certifying that all concrete furnished conforms in every particular to the particular to the proportions established by mix designs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to CBC Section 1905A.1.2, ACI 318 Section 5.6, and ASTM C172 shall be performed according to the following requirements:

1. Testing Frequency: Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231, pressure method, for normal-weight concrete; **one** test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

6. Compression Test Specimens: ASTM C31.

    a. Cast and laboratory cure one set of three standard cylinder specimens for each composite sample, unless otherwise directed.

7. Compressive-Strength Tests: ASTM C39; test one of the three laboratory-cured specimens at 7 days and one of the three specimens at 28 days.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, DSA, concrete batch plant, and Contractor on same day that tests are made. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Additional Tests: The testing service shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. If the strength acceptance criteria are not met, the concrete will be deemed defective and shall be placed or adequately strengthened in a manner outlined by the Architect or Structural Engineer.

END OF SECTION 03 30 00

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 SUBMITTALS

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

B. California Green Building Standards Code Submittals:

1. Laboratory Test Reports: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name.

E. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welding connections. Include data on types of tests conducted and test results.

F. Qualification Data: For qualified Installer and fabricator**.**

G. Welding certificates indicating that welders employed in the work have satisfactorily passed AWS Qualification tests. If recertification of welders is required, retesting will be Contractor's responsibility.

H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

I. Mill test reports for structural steel, including chemical and physical properties.

J. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Non-shrink grout.

K. Source quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

B. Comply with applicable provisions of the following specifications and documents, except as otherwise indicated:

1. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC 360 "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," latest edition, including "Commentary" and Supplements thereto as issued.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
4. AWS D1.1 "Structural Welding Code."
5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

C. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

D. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F1852 fasteners and for retesting fasteners after lubrication.

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

B. W-Shapes: ASTM A992.

C. Channels, Angles: ASTM A36.

D. Plate and Bar: ASTM A36.

E. Cold-Formed Hollow Structural Sections: ASTM A500, Grade C, 50 ksi, structural tubing.

F. Steel Pipe: ASTM A53, Type E or S, Grade B.

1. Finish: Black.

G. Steel Castings: ASTM A216, Grade WCB with supplementary requirement S11.

H. Steel Forgings: ASTM A668.

I. Welding Electrodes: Comply with AWS requirements and the following:

1. All welding to be done using E70xx electrodes.
2. For welding ASTM A572 grade 50 and ASTM A992 steel, maximum diffusible hydrogen content: 16ml/100g (H16).
3. Charpy V-Notch Toughness: 20 ft-lbs at 0°F (minimum.)

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. Machine Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

B. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade C, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959, Type 325, compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.
2. Direct-Tension Indicators: ASTM F959, Type 325, compressible-washer type with mechanically deposited zinc coating.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

E. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Unheaded Anchor Rods: ASTM F1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A563 heavy-hex carbon steel.
3. Plate Washers: ASTM A36 carbon steel.
4. Washers: ASTM F436, Type 1, hardened carbon steel.
5. Finish: Plain.

G. Headed Anchor Rods: ASTM F1554, Grade 36, straight.

1. Nuts: ASTM A563 heavy-hex carbon steel.
2. Plate Washers: ASTM A36 carbon steel.
3. Washers: ASTM F436, Type 1, hardened carbon steel.
4. Finish: Plain.

H. Threaded Rods: ASTM A 36.

1. Nuts: ASTM A563 heavy-hex carbon steel.
2. Washers: ASTM A36 carbon steel.
3. Finish: Plain.

I. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A108, Grade 1035.

J. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1030.

K. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1018.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

1. Minimum Compressive Strength: 7500 psi at 28 days.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A6 and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
6. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/ and manufacturer's written instructions.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened and Slip critical. Refer to structural drawings.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

C. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 2.0 mils.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

D. Welded Connections: If required, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E165.
2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E164.
4. Radiographic Inspection: ASTM E94.

E. If required, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surveys: Employ a registered professional engineer or land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect.

B. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Anchor Bolts: Furnish Anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

1. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.
2. Refer to Division 3 of these specifications for anchor bolt installation requirements in concrete.

C. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on setting (leveling) nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

E. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be

in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

F. Splice members only where indicated.

G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.

H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened and Slip critical.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
4. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. If required, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E165.
b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

c. Ultrasonic Inspection: ASTM E164.
d. Radiographic Inspection: ASTM E94.

D. If required, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 05 12 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal bollards.

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

1. Section 03 30 00 " Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Paint products.
3. Grout.
4. Pre-cast concrete bollard caps.

B. Furnish certification that all paint coatings furnished for the location of the project comply with the EPA clean air act for permissible levels of volatile organic content for architectural coatings applied in California as designated by California Air Resources Board (CARB), 2022 California Green Building Standards Code, and the San Joaquin Valley Air Pollution Control District (SJVAPCD).

C. Shop Drawings: Show fabrication and installation details. Provide Shop Drawings for the following:

1. Metal bollards.

1.5 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A572, Grade 50.

C. Stainless-Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.

D. Stainless-Steel Bars and Shapes: ASTM A276, Type 304.

E. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

F. Rolled-Stainless-Steel Floor Plate: ASTM A793.

G. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

H. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

I. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches and As indicated on approved drawings.
2. Material: Galvanized steel, ASTM A653/A653M, structural steel, Grade 33, with G90 coating; 0.108-inch (minimum) nominal thickness.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior and commercial kitchen use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.

D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329.

F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Concrete: Comply with requirements in Section 03 30 53 "Miscellaneous Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

F. Pre-cast concrete bollard caps: Use diameter to match the bollard. Complies with ASTM C494 compressive strength testing for 5000 psi concrete and ASTM C666 Freeze Thaw Resistance testing. Finish with paint systems indicated.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.

C. Galvanize miscellaneous framing and supports where indicated.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim.

D. Prime miscellaneous steel trim with zinc-rich primer

2.8 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 80 steel pipe.

B. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch wall-thickness steel tubing with an OD approximately 1/16 inch less than ID of bollards. Match drill sleeve and bollard for 3/4-inch steel machine bolt.

C. Prime bollards with zinc-rich primer.

2.9 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.10 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.11 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 09 96 00 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING METAL BOLLARDS

A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

B. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.

C. Place removable bollards over internal sleeves and secure with 3/4-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner furnishes padlocks.

D. Fill bollards solidly with concrete, and “wet-set” pre-cast concrete bollard cap per manufacturer’s recommendations.

1. Do not fill removable bollards with concrete.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Structural dimension lumber framing.

B. Exposed timber structural framing.

C. Non-structural dimension lumber framing.

D. Rough opening framing for doors, windows, and roof openings.

E. Sheathing.

F. Roof-mounted curbs.

G. Roofing nailers.

H. Preservative treated wood materials.

I. Fire retardant treated wood materials.

J. Miscellaneous framing and sheathing.

K. Communications and electrical room mounting boards.

L. Concealed wood blocking, nailers, and supports.

M. Miscellaneous wood nailers, furring, and grounds.

1.02 **RELATED REQUIREMENTS**

A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.

B. Section 05 50 00 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.

C. Section 06 17 33 – Wood I-Joists

D. Section 06 18 00 – Glued-Laminated Construction

E. Section 07 27 26 – Fluid-Applied Membrane Air-Barriers: Water-resistive, vapor-permeable membrane air barriers over sheathing.

F. Section 31 31 16 - Termite Control: Field-applied termiticide and mildewcide for wood materials.

1.03 **REFERENCE STANDARDS**

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

C. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).

D. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010 (Reapproved 2017).

E. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

H. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.

I. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers 2016.

J. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems 2014, with Editorial Revision (2017).

K. PS 1 - Structural Plywood 2009.

L. PS 2 - Performance Standard for Wood-Based Structural-Use Panels 2010.

M. PS 20 - American Softwood Lumber Standard 2020.

N. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.

O. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.

1.04 **SUBMITTALS**

A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

D. Samples: For rough carpentry members that will be exposed to view, submit two samples, 4 by 6 inch in size illustrating wood grain, color, and general appearance.

E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 **DELIVERY, STORAGE, AND HANDLING**

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 **GENERAL REQUIREMENTS**

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.

2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 **DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR) and Redwood Inspection Service; RIS (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Stud Framing (2 by 2 through 2 by 6):

1. Species: Douglas Fir-Larch.

2. Grade: No. 2.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):

1. Species: Douglas Fir-Larch.

2. Grade: No. 1.

F. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Species: Douglas Fir-Larch, Redwood, or Western Cedar (Redwood and Western Cedar shall be used as nailers in Continuous Insulation Assemblies associated with Exterior Cement Plaster, unless otherwise noted or shown in approved details.)

2. Lumber: S4S, No. 2 or Standard Grade.

3. Boards: Standard or No. 3.

2.03 **EXPOSED DIMENSION LUMBER**

A. Grading Agency: Redwood Inspection Service; RIS (GR).

B. Sizes: Nominal sizes as indicated on drawings.

C. Surfacing: S4S.

D. Moisture Content: S-dry or MC19.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):

1. Species: Redwood.

2. Grade: Select Heart.

2.04 **TIMBERS FOR CONCEALED APPLICATIONS**

A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry (19 percent maximum).

D. Beams and Posts 5 inches and over in thickness:

1. Species: Douglas Fir-Larch.

2. Grade: Select Structural.

2.05 **EXPOSED TIMBERS**

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: Kiln-dry (20 percent maximum).

C. Surfacing: S4S.

D. Species: Redwood.

E. Grade: Clear Heart Structural.

2.06 **STRUCTURAL COMPOSITE LUMBER**

A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.

B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

1. Columns: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 1,800,000 psi, minimum.
2. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 1,800,000 psi, minimum.
3. Headers: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber.

2.07 **EXPOSED BOARDS**

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: Kiln-dry (15 percent maximum).

C. Surfacing: S4S.

D. Species: Douglas Fir.

E. Grade: No. 1, 1 Common, or Select.

2.08 **CONSTRUCTION PANELS**

A. Roof Sheathing: Any PS 2 type, rated Structural I Sheathing.

1. Bond Classification: Exterior.
2. Span Rating: 48.
3. Performance Category: 3/4 PERF CAT.

B. Wall Sheathing: Any PS 2 type.

1. Bond Classification: Exposure 1.
2. Grade: Structural I Sheathing.
3. Span Rating: 24.
4. Performance Category: 1/2 PERF CAT.
5. Edge Profile: Square edge.

C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4-inch-thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

D. Other Applications:

1. Plywood Concealed from View but Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View but Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.09 **ACCESSORIES**

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M or stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.

C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.

D. Sill Gasket on Top of Foundation Wall: 1/4-inch-thick, plate width, closed cell plastic foam from continuous rolls.

E. Termite-Resistant Sill Plate Barrier: Self-adhesive, film-backed barrier with release sheet; adheres to concrete substrates and blocks termite access.

1. Thickness: 68 mils (0.068 inch).

2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.

3. Water Vapor Permeance: 0.035 perm (2 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.

F. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

G. Water-Resistive Barrier: As specified in Section 07 25 00.

2.10 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:

1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.

a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.

b. Do not use treated wood in direct contact with the ground.

2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.

a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.

b. Treat rough carpentry items as indicated.

c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:

1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    b. Treat lumber exposed to weather.
    c. Treat lumber in contact with masonry or concrete.
    d. Treat lumber in other locations as indicated.
2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
    a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
    b. Treat plywood in contact with masonry or concrete.
    c. Treat plywood in other locations as indicated.
3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
    a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
    b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 PREPARATION

A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes.

E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

F. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.

G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:

1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Towel and bath accessories.
6. Wall-mounted door stops.
7. Chalkboards and marker boards.
8. Wall paneling and trim.
9. Joints of rigid wall coverings that occur between studs.
10. Backing shown on approved drawings that is associated with continuous insulation and exterior cement plaster applications.

3.05 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

1. At long edges use sheathing clips where joints occur between roof framing members.
2. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum on center on all edges and into studs in field of board.

1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.

3.07 **SITE APPLIED WOOD TREATMENT**

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.08 **TOLERANCES**

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.09 **CLEANING**

A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

A. END OF SECTION

SECTION 06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Plastic-laminate countertops.
3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

1. Section 05 40 00 “Cold-Formed Metal Framing” for metal stud backing concealed within other construction before cabinet installation.
2. Section 05 50 00 “Metal Fabrications” for steel framing and support of countertops.
3. Section 06 10 00 “Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 SUBMITTALS

A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, and cabinet hardware and accessories.

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For composite wood products:

a. Hardwood plywood, particleboard, and medium density fiberboard composite wood products shall meet the requirements for formaldehyde as specified in California Air Resources Board’s (ARB) Air Toxics Control Measure (ATCM) for Composite Wood (CCR Title 17, Section 93120, et seq.) Materials not exempted under the ATCM must meet the specified emission limits as shown in GBC Table 5.504.4.5.

C. Shop Drawings: Show location of each item, dimensioned plans, elevations, and sections, large-scale details, attachment devices, and other components.

1. Submit shop drawings in conformance with the requirements of the current edition of the North American Architectural Woodwork Standards.
2. Drawings indicate form and profile concept only. Submit shop drawings to illustrate Fabricator’s understanding of Drawings and to show intended fabrication details. A photocopy or traced copy of Drawings in not acceptable for shop drawings.
3. Prepare shop drawings using field verified dimensions. Report any major discrepancies between Drawings and field dimensions before fabrication of work.

4. For the initial review submit two copies of shop drawings to Architect (11 inch by 17 inch minimum size.) PDF's are acceptable for initial review.
5. Show details full size.
6. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
7. Show anchoring and attachment method and coordinate with DSA approved details shown on the Drawings.
8. Show method of scribing.
9. Coordinate dimensions of built-in equipment and fixtures.
10. Show casework hardware indicating brand name and model used.
11. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
12. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, electrical switches and outlets, and other items installed in plastic-laminate countertops.
13. Show special accessory components not included in manufacturer's product data.
14. Apply WI Certified Compliance Program label to Shop Drawings.

D. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
2. Wood-grain plastic laminates, 12 by 24 inches, for each type, pattern and surface finish, with one sample applied to core material and specified edge material applied to one edge.
3. Thermoset decorative panels, 8 by 10 inches, for each color, pattern, and surface finish, with edge banding on one edge.
4. Solid-surface-material, 6 inches square for each color.
5. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Qualification Data: For Installer and Fabricator.

F. Product Certificates: For each type of product.

G. Woodwork Quality Standard Compliance Certificates: Woodwork Institute (WI) Certified Compliance Program certificates.

1. Before delivery to the jobsite the woodwork supplier shall provide a Woodwork Institute Certified Compliance Certificate indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
2. Each elevation of casework, each laminated top, and each solid surface top shall bear a Woodwork Institute Certified Compliance Label. Final inspection shall by done by WI inspector and labels applied by WI Inspector.
3. At completion of installation the woodwork installer shall provide a Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
4. All fees charged by the Woodwork Institute for their Certified Compliance program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.

B. Installer Qualifications: Fabricator of products or Licensee of WI's Certified Compliance Program.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets and countertops until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets and countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

B. Cabinets and countertops shall acclimate in spaces where they will be installed a minimum of 72 hours before installation.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets and countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets and countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets and countertops by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets and countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

2. Number designations on plans refer to WI Casework Design Series (CDS) numbers in Appendix A of the latest North American Architectural Woodwork Standards (NAAWS).
3. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Custom.

C. Construction Style: A – Frameless.

D. Construction Type: Type I – Multiple Self-Supporting Units.

E. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

F. Core Thickness: 3/4 inch, unless otherwise noted.

G. Shelves: Conform to NAAWS requirements, subject to a 50 psf uniformly spaced load not to exceed 200 pounds per shelf.

1. Shelves deeper than 24 inches shall have three supports at each end of shelf.
2. Shelves greater than 24 inches in length shall be at least 1-inch thick. Refer to North American Architectural Woodwork Standards for length limitations of 1-inch thick material and utilize appropriate shelf material for length of cabinets detailed and shown on drawings.

H. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Wilsonart International; Div. of Premark International, Inc.
b. Abet Laminati, Inc.
c. Formica Corporation.
d. Lamin-Art, Inc.
e. Panolam Industries International, Inc.

I. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGL.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: Grade VGS.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

J. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade CLS.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12-inch-thick, matching laminate in color, pattern, and finish.
b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade CLS.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels, 1/2 inch thick (minimum).

K. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

L. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

M. Drawer Construction:

1. Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
2. Acceptable Joinery Methods:

a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.
b. Doweled, glued under pressure.
c. Lock shoulder, glued and pin nailed.
d. Bottoms shall be set into sides, front, and back, 1/4-inch-deep groove, with a minimum 3/8-inch standing shoulder.

3. File Drawers: Unless otherwise indicated, direction of file folder shall be parallel to drawer door. Provide adequate, clear inside dimensions for hanging file folders. Minimum clear inside drawer dimensions shall be as follows:

a. Letter size file folders: Minimum 13-¼ inch wide by 10-½ inch high.
b. Legal size file folders: Minimum 16-¼ inch wide by 10-½ inch high.

N. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from laminate manufacturer's full range in the following categories:

a. Solid colors, matte finish.
b. Wood grains, matte finish.
c. Patterns, matte finish.

2.2 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "North American Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. Provide labels and certificates from WI certification program indicating that countertops, including installation, comply with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS or HGP.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Wilsonart International; Div. of Premark International, Inc.
    b. Abet Laminati, Inc.
    c. Formica Corporation.
    d. Lamin-Art, Inc.
    e. Panolam Industries International, Inc.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by manufacturer's designations.
2. Match Architect's sample.
3. As selected by Architect from manufacturer's full range in the following categories:

    a. Solid colors, matte finish.
    b. Patterns, matte finish.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Particleboard or medium-density fiberboard.

G. Core Material at Sinks: Particleboard made with exterior glue, medium-density fiberboard made with exterior glue or exterior-grade plywood.

H. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde or Grade M-2-Exterior Glue (where called for in other areas of the specifications or on the drawings.)
3. Softwood Plywood: DOC PS 1, medium-density overlay.

4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Butt Hinges: 2-3/4-inch, five-knuckle, grade 1 steel hinges made from 0.095-inch- thick metal, and as follows:

1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521. Equal to RPC; #374-P28-B; Chrome Powder Coat Finish.

C. Steel Wire U-Pulls (fully accessible): Back mounted, steel, 5 inches long, 1-1/2 inches deep, and 5/16 inch in diameter. Finish: Nickle-Plated Matte

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Adjustable Shelf Standards and Supports (Display Cabinets and where called for on drawings): BHMA A156.9, B04102; with shelf brackets, B04112.

F. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip. Equal to Vasa #2-7875-104

G. Drawer Slides: BHMA A156.9.

1. Grade 1: Side mounted full-extension type; zinc-plated steel with polymer rollers. Equal to Accuride Model 2632.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides. Equal to Accuride Model 7432 (Grade 1HD-100) and Accuride Model 3640 (Grade 1HD-200).
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
6. For computer keyboard shelves, provide Grade 1HD-100.
7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.

H. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.

I. Cabinet Locks (except Teacher Wardrobe Locks): Each room shall have cabinets keyed alike, and differently from cabinets of other rooms. A master key shall be provided for all cabinets in the building. 5 pin cylinder master keyed to MK 99699. Provide a minimum of 4 matching keys per room with Architectural Cabinets and 4 copies of the master keys for the building.

1. Door Locks: BHMA A156.11, E07121. Equal to Olympus Lock, Inc.; #100-26D78MK; dull chrome finish.
2. Drawer Locks: BHMA A156.11, E07041. Equal to Olympus Lock, Inc.; #200-26D78MK; dull chrome finish.
3. Showcase Locks: BHMA A156.11. Equal to Olympus Lock, Inc.; #329R-26D78MK; dull chrome finish.

J. Teacher Wardrobe Locks: Teacher Wardrobe Locks with Interchangeable Cores (IC) shall be keyed to the classroom entrance lock with Schlage “Primus” System, Security Level Three, Type EP keyways per Final Keying System described in Specification Section 08 71 00 “Finish Hardware.”

1. Door Locks: BHMA A156.11, Grade 1. Equal to Schlage Cabinet Deadbolt Locks; CL774R with Full Size IC; 626 Satin Chrome Finish.

K. Door Silencers: BHMA A156.16, L03011. Drawer Silencers are not allowed. Closing stops for drawers are to be provided at the rear of the both drawer sides, unless closing stops are built into the slides to prevent drawer front from impacting the cabinet body.

L. Grommets for Cable Passage through Countertops: 2-½ inch OD black, molded-plastic grommets and matching plastic caps with slot for wire passage.

M. Ventilation Grills: Equal to Hafele; #571.54.248; 9 1/16 inches wide x 2 11/16 inches high by 8mm deep plastic air ventilation grill with flanged rim; color: chrome plated.

N. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

O. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Toe Kicks: Wood-Preservative-Treated Lumber per Specification Section 06 10 00 “Rough Carpentry.”

C. Anchors: Provide anchorage as indicated in drawings.

D. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.6 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide units with smooth surfaces in uniform plane, free of defects. Provide front and end overhang of 1 inch over base cabinets.

C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed

after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets and countertops to average prevailing humidity conditions in installation areas.

B. Before installing cabinets and countertops, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets and countertops to comply with same grade as item to be installed.

B. Assemble cabinets and countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
2. Seal edges of cutouts by saturating with varnish except at plumbing fixtures and areas subject to excessive moisture.
3. Seal edges subject to excessive moisture with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install cabinets and countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut cabinets and countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Anchor cabinets to anchors or blocking built in or directly attached to substrates as detailed on drawings.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets as detailed on the Drawings.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets and countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean all installed items of pencil and ink marks and broom clean the area of operation, depositing debris in containers provided by the general contractor. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 41 16

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Formed Products:

a. Formed sheet metal fabrications.

B. Related Sections:

1. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of special conditions.
6. Details of connections to adjoining work.
7. Layout drawings at a scale of not less than 1/4 inches per 12 inches.
8. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.

C. Qualification Data: For qualified fabricator.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation; structural quality.
2. Surface: Smooth, flat and mill phosphatized for field painting

2.2 UNDERLAYMENT MATERIALS

A. Flexible Flashings: Self-adhesive, all butyl (no asphalt) waterproof membrane laminated to high density engineered film membrane.

1. Types:

a. Waterproof: Henry - FortiFlash® Butyl Waterproof Flashing.

2. Reference Standards: AAMA 711.
3. Water Vapor Permeance: <.1 (waterproof); ASTM F1249, E96 (A).
4. Water Resistance: 200 hours (waterproof); ASTM D779.

B. Primer: Polymer emulsion based primer for self-adhesive membranes as needed.

1. Types:

a. Primer: Henry® - Aquatac Primer.

2. Composition: Water based, VOC< 50 g/L.

C. Sealant: One component, moisture curing, non-sag, gun-grade elastomeric polymer for use as a sealant or liquid applied flashing.

1. Types:

a. Sealant: Henry – Moistop® Sealant.

2. Referenced Standard: AAMA 808.3 and ASTM C920.
3. Movement Capability: ±25%; ASTM C719.
4. Max VOC: 9 g/L; ASTM D3960.
5. Compatibility: Tested for compatibility with flexible flashing; AAMA 713.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153 or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

H. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Apply flashing membrane in accordance with manufacturer's recommendations, laid smooth without creases or bunches of material. Verify compatibility with adjacent materials prior to installation.

1. Seam Overlap: As recommended by flashing manufacturer for application indicated.
2. Flashing: As recommended by manufacturers published guides, industry standard installation methods, or project specific architectural details.

B. To apply flashing, peel away the release sheet and press membrane firmly over substrate, applying sufficient pressure with a metal or wood roller along the entire membrane to ensure a continuous seal.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
4. Install sealant tape where indicated.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of flexible flashing underlayment.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 3/4 inch for wood screws and metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50

percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Non-staining silicone joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.
5. Latex joint sealants.

B. Related Requirements:

1. Section 07 92 19 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.
2. Refer to sections of Divisions 21, 22, 23, 26, 27, and 28 for joint sealers in mechanical, electrical, and plumbing work not called for in this section.
3. Section 32 13 73 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

C. General Performance; Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Installation Instructions: Manufacturer’s written installation instructions for products and applications indicated for each joint-sealant product.

C. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For sealants, sealant primers, and caulks, documentation indicating that products:

a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 and 5.504.4.2 (2022 California Green Building Standards Code).
b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.

2. Product Data: For smaller unit sizes of sealant, sealant primer, or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):

a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

D. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

E. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

F. Sample Warranties: For special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.

4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

B. Silicone, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

C. Silicone, S, P, 100/50, T, NT: Single-component, pourable, plus 100 percent and minus 50 percent movement capability traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 100/50, Uses T and NT.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

2.5 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.

2.6 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.7 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning

operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.
b. Masonry.
c. Unglazed surfaces of ceramic tile.
d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces **JS-1**.

1. Joint Locations:
   a. Isolation and contraction joints in cast-in-place concrete slabs.
   b. Other joints as indicated on Drawings.

2. Joint Sealant: Silicon, S, P, 100/50, T.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces **JS-2**.

1. Joint Locations:

   a. Construction joints in cast-in-place concrete.
   b. Joints in exterior porcelain tile cladding.
   c. Joints in exterior insulation and finish systems.
   d. Joints between metal panels.
   e. Joints between different materials listed above.
   f. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
   g. Control and expansion joints in ceilings and other overhead surfaces.
   h. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces **JS-3**.

1. Joint Locations:

    a. Isolation joints in cast-in-place concrete slabs.
    b. Control and expansion joints in tile flooring.
    c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicon, S, P, 100/50, T.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces **JS-4**.

1. Joint Locations:

    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Tile control and expansion joints.
    c. Vertical joints on exposed surfaces of cast-in-place concrete stem walls and curbs.
    d. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement **JS-5**.

1. Joint Locations:

    a. Control joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    c. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces **JS-6**.

1. Joint Locations:

    a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    b. Tile control and expansion joints where indicated.
    c. Inside corners of ceramic tile walls and wainscot surfaces.
    d. Perimeter joints between interior ceramic tile wall surfaces and frames of interior doors.
    e. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

G. Joint-Sealant Application: Concealed mastics **JS-7**.

1. Joint Locations:

    a. Aluminum thresholds.

b. Sill plates.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:

1. Section 08 14 16 “Flush Wood Doors” for wood doors.
2. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. Installation Instructions: Manufacturer’s written installation instructions for each type of product.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

E. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door & frame to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ceco Door Products; an Assa Abloy Group company.
2. Door Components, Inc.
3. Curries Company; an Assa Abloy Group company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door Schedule on drawings.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.053 inch (16 gauge).
d. Edge Construction: Model 2, Seamless.
e. Core: Polyurethane.

3. Frames:

a. Materials: Metallic-coated, steel sheet, minimum thickness of 0.067 inch (14 gauge).
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.3 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.4 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.5 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
2. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
3. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide flat -head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
2. Provide loose stops and moldings on inside of hollow-metal work.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.7 ACCESSORIES

A. Metal Security Louvers: Provide louvers for door, where indicated, which comply with SDI 111C.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anemostat; a Mestek company; PLSL.
b. Air Louvers Inc.; 1500-ASG.

2. Blade Type: Vision-proof, inverted Y.
3. Metal and Finish: Hot-dip galvanized steel, Frame & Grille: minimum 0.096 inch thick (12 gauge), Louver Blades: minimum 0.040 inch thick (18 gauge), factory primed for paint finish.

B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    b. Install frames with removable stops located on secure side of opening.
    c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch minus 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch minus 1/32 inch.
    c. At Bottom of Door (No Threshold): 1/2 inch minus 1/32 inch.
    d. At Bottom of Door (Threshold): 3/8 inch minus 1/32 inch.
    e. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 08 11 13 “Hollow Metal Doors and Frames” for flush wood doors in steel frames.
2. Section 08 71 00 “Door Hardware” for door hardware for flush wood doors.
3. Section 09 91 00 “Painting and Finishing” for field finishing doors.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings.

B. Installation Instructions: Manufacturer’s written installation instructions for each type of product.

C. California Green Building Standards Code Submittals:

1. Laboratory Test Reports: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Laboratory Test Reports: For composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.

F. Samples for Verification:

1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

G. Sample Warranty: For special warranty.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.6 WARRANTY

A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Oregon Door
2. Substitutions: Refer to Section 01 25 16 “Product Options and Substitutions

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

D. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom.
2. Faces: Paint Grade Birch.
3. Exposed Vertical and Top Edges: Paint Grade Birch.
4. Core: Particleboard.
5. Construction: Five plies. Stiles and rails are bonded to core and then entire unit is abrasive planed before veneering.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 08 71 00 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch) at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide1/4 inch from bottom of door to top of threshold unless otherwise indicated.

    a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 71 00 – FINISH HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware
3. Automatic operators
4. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Flush Wood Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
8. State Building Codes, Local Amendments.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication, and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the

end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.

   b. Manufacturer of each item.

   c. Fastenings and other pertinent information.

   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

   e. Explanation of abbreviations, symbols, and codes contained in schedule.

   f. Mounting locations for door hardware.

   g. Door and frame sizes and materials.

   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.

   b. Complete (risers, point-to-point) access control system block wiring diagrams.

   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through the Norton Preferred Installer (NPI) program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.

F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third-party source will not be accepted.

G. California Building Code: Provide hardware that complies with CBC Section 11B.

1. All openings as a part of an accessible route shall comply with CBC Section 11B-404.

2. The clear opening width for a door shall be 32” minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There shall be no projections into it below 34” and 4” maximum projections into it between 34” and 80” above the finish floor or ground. Door closers and stops shall be permitted to be 78” minimum above the finish floor or ground. CBC Section 11B-404.2.3.

3. Operable hardware on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Operable parts of such hardware shall be 34” minimum and 44” maximum above finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.

4. Hardware (including panic hardware) shall not be provided with “nightlatch” function for any accessible doors or gates unless the following conditions are met:

a. Such hardware has a ‘dogging’ feature and is dogged during the time the facility is open.

b. All 'dogging' operation is performed only by employees as their job function (non-public use).

5. The force for pushing or pulling open a door shall be in accordance with CBC Section 11B-404.2.9.

   a. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 pounds (22.2 N) maximum. Required fire doors: the minimum opening force allowable by the DSA authority, not to exceed 15 pounds (66.7N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.

   b. The force required for activating any operable parts, such as lever hardware, or disengaging other devices shall be 5 pounds (22.2N) maximum to comply with CBC Section 11B-309.4.

   c. The 5 pound (22.2 N) maximum force shall be validated for the size of the door used. The Building Materials Listing of the California State Fire Marshal shall indicate that the door hardware meets the 5 pound (22.2 N) force and shall also list the largest door that can be used.

6. Door closing speed shall comply with CBC Section 11B-404.2.8. Closers shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.

7. Floor stops shall not be located in the path of travel and 4" maximum from walls.

8. Thresholds shall comply with CBC Section 11B-404.2.5. The floor or landing shall not be more than ½ inch lower than the threshold of the doorway. Change in level between ¼ inch and ½ inch shall be beveled with a slope no greater than one unit vertical in two units horizontal (50 percent slope.

H. Fire-rated Openings: Provide hardware for fire-rated openings in compliance with UL10B. Provide only hardware which has been tested and listed by UL for types and sizes of doors required and complies with requirements for door and door frame labels. In addition manual locks shall comply with California State Standards (CSS) 12-33-2 and panic hardware shall comply with CSS 12-33-3.

   Where emergency exit devices are required on fire-rated doors, provide supplementary marking on doors UL labels indicating "Fire Exit Hardware."

I. Group E lockable doors from the inside: Doors to rooms with an occupancy of five or more persons shall be equipped with locks that are lockable from inside the space per 2022 CBC Section 1010.1.11. In addition, the locks shall conform to the specifications and requirements found in 2022 CBC Section 1010.1.9.

J. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

K. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

   1. Function of building, purpose of each area and degree of security required.

   2. Plans for existing and future key system expansion.

   3. Requirement for key control storage and software.

   4. Installation of permanent keys, cylinder cores and software.

5. Address and requirements for delivery of keys.

L. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

3. Review sequence of operation narratives for each unique access controlled opening.

4. Review and finalize construction schedule and verify availability of materials.

5. Review the required inspecting, testing, commissioning, and demonstration procedures

M. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software, or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software, and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for extra heavy duty cylindrical (bored) locks and latches.
2. Twenty-five years for manual overhead door closer bodies.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:
   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
    a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
    a. Hager Companies (HA) - BB Series, 5 knuckle.
    b. Ives (IV) - 5BB Series, 5 knuckle.
    c. McKinney (MK) - TA/T4A Series, 5 knuckle.

2.3 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Manufacturers:
    a. Hiawatha, Inc. (HI).
    b. Rockwood (RO).
    c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum ten years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.

1. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
2. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
3. Locks are to be non-handed and fully field reversible.
4. Manufacturers:
   a. Corbin Russwin Hardware (RU) - CLX3300 Series.
   b. Sargent Manufacturing (SA) - 10X Line.
   c. Schlage (SC) - ND Series.

2.6 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless-steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - DL4000 Series.

b. Sargent Manufacturing (SA) - 4870 Series.

c. Schlage (SC) – L400 Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2. Strikes for Bored Locks and Latches: BHMA A156.2.

3. Strikes for Auxiliary Deadlocks: BHMA A156.36.

4. Dustproof Strikes: BHMA A156.16.

2.8 ELECTRIC STRIKES

A. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

1. Manufacturers:

a. HES (HS) - 9400/9500/9600/9700/9800 Series.

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.9 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.

b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

9. Rail Sizing: Provide exit device rails factory sized for proper door width application.

10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.

b. Sargent Manufacturing (SA) - 80 Series.

c. Von Duprin (VD) – 98/99 XP Series.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - DC8000 Series.

b. LCN Closers (LC) - 4040XP Series.

c. Norton Rixson (NO) - 7500 Series.

d. Sargent Manufacturing (SA) - 281 Series.

C. Low Energy Power Operator (Automatic Opener) Door Operator, Surface Mounted: ANSI/BHMA A156.19. Door Control exterior closing force shall be adjustable to ensure closing control. Door Operator shall simulate conventional door closer opening and closing forces unless the power operator motor is activated. Door operator shall have electronic backcheck to cushion door speed if door is opened violently. Door Operator shall be SELECTIVELY ACTIVATED by external initiation devices, i.e. wall switch, etc. Operator shall have selectable latch boost to provide additional closing force to overcome conditions that may prevent door from latching. Unit shall have delay switches for motor activation, electric lock interfacing, and hold open time. Units shall interface with latch retraction exit devices or similar products and have 24VDC at 1.3A maximum (less accessories) output for connection of electric strike, lock, radio frequency receiver, etc. Unit shall have a three-position Selector Mode Switch that will permit the unit to be switched “ON” to monitor for function inputs, switch to “H/O” for infinite hold open function or switched “OFF” which will disable function inputs allowing unit to be used as a manual door closer.

1. Manufacturers:

a. Norton Rixson (NO) - 6300 Series.

2. Accessories:

a. Low Profile Push Plate: 36” x 6” activation zone, 1” low profile depth, stainless steel face plate, adapts to either wireless (638) or hardwired installations (639).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
    a. Hiawatha, Inc. (HI).
    b. Ives (IV).
    c. Rockwood (RO).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).

2.13 POWER TRANSFER DEVICES

A. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
    a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney (MK) - Connector Hand Tool: QC-R003.
2. Manufacturers:
    a. Hager Companies (HA) - Quick Connect.
    b. McKinney (MK) - QC-C Series.

c. Dormakaba Best (ST) - WH Series.

2.14 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings, and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. DHI TDH-007-20: Installation Guide for Doors and Hardware.

3. Where indicated to comply with accessibility requirements, comply with Chapter 11B of the 2022 California Building Code. Hand-activated hardware such as lever locksets, exit devices, and push-pull handles shall be 34” minimum and 44” maximum above finish floor or ground.

4. Provide steel stud backing/blocking in drywall partitions to provide proper anchorage for wall stops or other wall mounted hardware.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating, and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware, and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware, the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. SC - Schlage
3. VD - Von Duprin
4. OT - Other
5. RO - Rockwood
6. NO - Norton
7. PE – Pemko
8. SU – Securitron
9. HA - Hager

Hardware Sets

Set: 1

Doors: 100, 101, 102, 103, 200, 201

1	Exit Device	AXXP-99-L-2SI-996L	US26D	VD
1	Electric Strike, Rim Panic	9600	630	HS
1	ElectroLynx Adaptor	2004M		HS
1	SMART Pac Bridge Rectifier	2005M3		HS
1	Automatic Opener	6331	689	NO
1	Frame Harness	QC-C1500x		MK
2	Door Switch (actuator)	639		NO
1	Power Supply	AQDx (Size as required)		SU
1	Balance of Hardware	Existing to Remain (clean & adjust as required)		OT

Set: 2

Doors: 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 121, 122, 125, 126, 202, 203, 205, and 206

1	No New Hardware	Existing to Remain (clean & adjust as required)		OT

Set: 3

Door: 127

3	Hinge (Heavy Weight)	BB1199	US26D	HG
1	Staff Toilet	ND85PD, Rhodes	US26D	SC
1	Cylinder	Match Facility Standard		OT
1	Surface Closer	PR7500DA	689	NO
1	Kickplate	K1050 10” high x CSK	US32D	RO
1	Wall Stop	409	US26D	RO
1	Silencer	608		RO

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Texture finishes.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For adhesives used to laminate gypsum board panels to substrates, documentation indicating that products:

a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 (2022 California Green Building Standards Code).
b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.

2. Product Data: For smaller unit sizes of adhesives (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):

a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

C. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain gypsum board products from a single manufacturer, or from manufacturer’s recommended by prime manufacturers of gypsum board panels

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Georgia-Pacific Gypsum LLC.
2. USG Corporation.
3. American Gypsum.
4. CertainTeed Corp.
5. National Gypsum Company.
6. PABCO Gypsum.
7. Temple-Inland.

B. Gypsum Board, Type X: ASTM C 1396.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
b. CertainTeed Corp.; GlasRoc Tile Backer.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate (including concrete curbs).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Grabber Construction Products; GDWAF – Drywall Adhesive.
b. W. W. Henry Company; Henry 317 Multipurpose Construction Adhesive.
c. Henkel Corporation; OSI F-38 – Drywall Adhesive

C. Steel Drill Screws: ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick. Screw shall be of sufficient length to achieve penetration through metal stud flange by no fewer than 3 exposed threads or 3/8 inch (whichever is greater.)

1. Size: #6 x 1 ¼ inch (minimum).
2. Head type: #2 Phillips drive, bugle-head.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

2.8 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

a. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

b. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
c. National Gypsum Company; Perfect Spray EM Texture.

2. Texture: Orange Peel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both

faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: All surfaces unless otherwise indicated.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws. Unless otherwise noted on the approved drawings, screws shall be spaced not more than 12 inches o.c. for ceilings and 16 inches o.c. for walls where framing members are 16 inches o.c. Screws shall be spaced not more than 12 inches o.c. for both ceilings and walls where the framing members are 24 inches o.c. Refer to approved drawings for alternative screw spacing at fire rated assemblies.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws. Unless otherwise noted on the approved drawings, for the base layer, screws shall be spaced not more than 24 inches on center for both walls and ceilings for framing at both 16 inches and 24 inches on center. Unless otherwise noted on the approved drawings, for the face layer, screws shall be spaced not more than 12 inches o.c. for ceilings and 16 inches o.c. for walls where framing members are 16 inches o.c. Screws shall be spaced

not more than 12 inches o.c. for both ceilings and walls where the framing members are 24 inches o.c. Refer to approved drawings for alternative screw spacing for the base and face layers at fire rated assemblies.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board and laminating adhesive manufacturers' written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use where indicated.
6. Curved-Edge Cornerbead: Use at curved openings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and under VFTW.
2. Level 2: Panels that are substrate for tile, acoustical panels, and under FRP.
3. Level 4: At panel surfaces that will be exposed to view. **These walls and ceilings will receive an "Orange Peel" texture.**

a. Primer and its application to surfaces are specified in Section 09 91 00 "Painting and Finishing."

E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 72 00 - FIBERGLASS REINFORCED PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

1.3 SUBMITTALS

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

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For adhesives, documentation indicating that products:

a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 (2022 California Green Building Standards Code).
b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.

2. Product Data: For smaller unit sizes of adhesives (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):

a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

C. Samples for Verification: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.
3. Testing Agency: UL.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery: Do not deliver to the job site until suitable storage space is available.

B. Storage, Handling and Protection: Provide all work or materials necessary to store, cover and protect materials specified and installed under this Section. Store materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity. Prevent marring of finished surfaces and keep materials clean during handling and installation operations. Protect exposed finish work and materials from damage after installation. Replace damaged items at no cost to Owner.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Marlite, Inc.; Marlite FRP Class A** or comparable product by one of the following:

a. Kemlite Company Inc.
b. Glasteel, a division of Stabilt America, Inc.
c. Nudo Products, Inc.
d. Panolam Industries International, Inc.

2. Nominal Thickness: Not less than 0.09 inch.
3. Surface Finish: Molded pebble texture.
4. Color: P-100 “White”.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: Match panels.

B. Adhesive: Water resistant and non-flammable adhesive, recommended by plastic paneling manufacturer and complying with ASTM C557.

C. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations, but not less than 24 hours before application.

E. Other trade work that penetrates the substrate shall be completed before beginning FRP panel application.

F. Remove switchplates, wall plates, and surface mounted fixtures in areas where wall covering is to be applied.

G. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches wide.

1. Mark plumb lines on substrate at trim accessory locations for accurate installation.
2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive. Do not fasten through panels. All trim accessories must provide for a minimum 1/8 inch of panel expansion at joints and edges, for proper installation.

D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Replace removed plates and fixtures; verify cut edges of panels area completely concealed.

G. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 09 72 00

SECTION 09 91 00 – PAINTING AND FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Painting schedules, including painting of exposed surfaces, interior and exterior, except as otherwise specified or indicated.

1.2 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications: Shop Primed Surfaces.

B. Section 06 20 13 – Exterior Finish Carpentry.

C. Section 06 20 23 – Interior Finish Carpentry.

D. Section 07 62 00 – Sheet Metal Flashing and Trim.

E. Section 08 11 13 – Hollow Metal Doors and Frames.

F. Section 08 31 13 – Access Doors and Frames.

G. Section 09 24 00 – Portland Cement Plastering.

H. Section 09 29 00 – Gypsum Board.

I. Divisions 21 – 23 – Mechanical Sections as applicable to the Project.

J. Divisions 25 – 28 – Electrical Sections as applicable to the Project.

1.3 REFERENCES

A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual

C. Referenced Standards:

1. ASTM D523 – Standard Test Method for Specular Gloss.
2. The Master Painters Institute, MPI Gloss and Sheen Levels.

1.4 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with sufficient documented experience.

B. Applicator: Company specializing in commercial painting and finishing with sufficient documented experience.

C. Gloss Levels: Per Master Painters Institute (MPI) gloss standards "MPI Gloss and Sheen Levels," measured in accordance with ASTM D523.

GLOSS LEVEL	DESCRIPTION	GLOSS AT 60 DEGREES ASTM D523	SHEEN AT 85 DEGREES ASTM D523
G1	A traditional matte finish – flat.	5 units, maximum	and 10 units, maximum
G2	A high side sheet flat – "a velvet-like finish."	10 units, maximum	And 10 – 35 units
G4	A "satin-like" finish	10-25 units	and 35 units maximum
G5	A traditional semi-gloss.	35 - 70 units	-
G6	A traditional gloss.	70 - 85 units	-
G7	A high gloss.	More than 85 units	-

1.5 REGULATORY REQUIREMENTS

A. Conform to California Building Code for flame spread and smoke density requirements for finishes.

B. Furnish certification that all paint coatings furnished for the location of the project comply with the EPA clean air act for permissible levels of volatile organic content for architectural coatings applied in California as designated by California Air Resources Board (CARB), 2022 California Green Building Standards Code, and the San Joaquin Valley Air Pollution Control District (SJVAPCD).

C. At the completion of the project, all open containers shall be disposed of by the contractor per State and County Regulations.

1.6 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Provide product data on all finishing products.

C. Submit four brush-out samples 8 inches by 10 inches in size illustrating color and gloss level selected for each surface finishing product scheduled.

D. Field Sample: Furnish sample of actual paint colors selected on portion of building item to receive paint as directed by Architect, prior to beginning interior and exterior painting.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in manufacturer's original unopened, labeled containers; inspect to verify acceptance.

B. Store and protect products from abuse and contamination.

C. Container labeling is to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation and instructions for mixing and reducing.

D. Store paint materials at minimum ambient temperature of 50 degrees F and a maximum of 90 degrees F, in well-ventilated area, unless required otherwise by manufacturer's instructions.

E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees F for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior work and interior work, unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

1.9 EXTRA STOCK

A. Provide a new and unopened five-gallon container of each type, color and sheen to Owner.

B. Label each container with vendor, paint type, color name, and color code, in addition to the manufacturer's label.

C. Coordinate with the District to transfer the extra stock over to the District.

PART 2 PRODUCTS

2.1 PAINT SYSTEMS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.2 SUSTAINABLE DESIGN REQUIREMENTS

A. VOC Content: Provide materials that comply with VOC limits set by Rule 4601 of the San Joaquin Valley Air Pollution Control District and 2022 California Green Building Standards Code Table 5.504.4.3; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content not more than 50 g/L.
2. Primers, Sealers, and Undercoaters: VOC content not more than 100 g/L.
3. Nonflat Paints and Coatings: VOC content not more than 100 g/L.
4. Nonflat-high gloss Paints and Coatings: VOC content not more than 150 g/L.
5. Stains: VOC content not more than 250 g/L.
6. Anti-Corrosive and Anti-Rust Paints and Primers applied directly to Ferrous Metals: VOC content not more than 250 g/L.
7. Zinc-Rich Primer applied to Galvanized and Ferrous Metals: VOC content not more than 340 g/L.

8. Varnish: VOC content not more than 450 g/L.

B. Chemical Components of **Field-Applied Interior Paints and Coatings**: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.
b. Acrylonitrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1, 2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

2.3 ACCEPTABLE MANUFACTURERS – PAINT

A. Refer to Table at the end of this Section.

B. Substitutions: Under provisions of Section 01 25 13.

2.4 ACCEPTABLE MANUFACTURERS – PRIMER SEALERS

A. Refer to Table at the end of this Section.

B. Substitutions: Under provisions of Section 01 25 13.

2.5 ACCEPTABLE MANUFACTURERS – STAIN AND CLEAR FINISHES

A. Refer to Table at the end of this Section.

B. Substitutions: Under provisions of Section 01 25 13.

2.6 MATERIALS

A. All paint materials shall be provided from a single manufacturer unless noted otherwise in this Section.

B. Coatings: Ready mixed. Process pigments to a soft paste consistency capable of being readily and uniformly dispersed to a homogeneous coating.

C. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

D. Accessory Materials: All other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

E. All Materials specified by brand name or manufacturer shall be delivered unopened at the job in their original containers.

2.7 FINISHES

A. Refer to schedule at end of Section for surface finish schedule.

PART 3 EXECUTION

3.1 GENERAL

A. Storage: All materials used by the painting contractor shall be stored and mixed in a place designated by the Owner or the Architect. The storage place must be kept neat and clean at all times. All cloths, waste or other material that might constitute a fire hazard shall be placed in a suitable metal container or shall be removed from the site or destroyed at the end of each day's work.

3.2 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application to the Architect, Architect's representative or inspector in writing. The Architect will cause such defect to be remedied.

C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster; Gypsum Wallboard: 12 percent.
2. Concrete Masonry Units: 10 percent.
3. Interior Located Wood: 15 percent.
4. Exterior Located Wood: 7 percent.

D. Beginning of application constitutes acceptance of the surfaces.

3.3 PREPARATION

A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or painting.

B. Correct minor defects and clean surfaces that affect work of this Section.

C. Seal marks that may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Gypsum Board Surfaces: Latex fill minor defects. Spot-prime defects after repair.

F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer, unless otherwise recommended by finish coating system manufacturer.

G. Shop-Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces as recommended by primer manufacturer. Prime shop-primed steel items with steel primers specified in this Section.

H. Concrete, Stucco and Masonry: All dust and loose mortar shall be removed by sweeping or by brushing with a stiff fiber or wire brush.

1. Concrete and masonry surfaces that show signs of efflorescent shall be treated with a zinc sulfate wash (3lbs. per gallon of water), or by scrubbing affected areas with a solution of muriatic acid. Remove loose crystals and rinse with clear water. Allow to dry thoroughly before painting.

a. All surfaces defects and all cracks more than 1/16 inch wide shall be filled with patching plaster or spackle according to package directions and textured to match adjacent areas.
b. Form oils or separating agents that might impair the adhesion or the appearance of the specified finish shall be removed before any materials are applied.

2. Plaster work that has cured for less than two months and all other plaster areas that show the presence of excessive amounts of free alkali when tested with phenolphthalein or some other suitable means shall be treated with a zinc sulfate wash (3 lbs. per gallon of water) to neutralize the alkali and obtain the optimum of surface carbonation.

a. All surface Cracks greater than 1/32 inch wide, holes and other surface defects shall be repaired as recommended by the finish paint manufacturer’s written instructions.

I. Interior Wood Items Scheduled to Receive Finish: Hand sandpaper and wipe off dust and grit prior to priming. Seal knots, pitch streaks and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

1. At woodwork with transparent finish, nail holes, cracks or defects shall be filled with wood filler tinted to match color of stain.

3.4 PROTECTION

A. Protect elements surrounding the work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by work of this Section.

C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.5 WORKMANSHIP

A. All work shall be performed by experienced mechanics in a skillful manner. All materials shall be evenly applied so as to be free from sags, crawls or other defects. Coats shall be of the proper consistency and well brushed out as to show the minimum brush marks, except varnish and enamel which shall be uniformly applied. Brushes shall be clean and in good condition. All areas with a transparent coat will be repainted at contractor's expense.

B. All painting shall be by brush, except plaster and gypsum board which may be by spraying with back rolling. Underside of soffits, covered walks, acoustical panels and screens may be completed by spraying with back rolling.

C. No work shall be completed under conditions that are unsuitable for the production of good results. No painting shall be completed while plaster is curing, or while wood sawing, sanding or cleaning is in process. Coats shall be thoroughly dry before the succeeding coat is applied. Finishes shall be uniform as to sheen, shine, color and texture, except when glazing is required.

D. No exterior painting shall be done in rainy, damp, or frosty weather. No Interior painting or finishing shall be permitted until the building has been thoroughly dried out by artificial heat. A minimum temperature of 50 degrees Fahrenheit shall be maintained in areas where the application or drying of paint is occurring.

E. This contractor shall take into account that not less than the following percentages of total surfaces shall be painted in deep (dark) tones of color selected: (This includes colors requiring ultra-deep bases)

1. Walls: 25%
2. Ceilings: 25%
3. Doors and Door Frames: 100%
4. Sheet Metal: 50%
5. Exposed Steel: 100%

3.6 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

1. Paint mil thicknesses shall not be less than the minimums recommended by the paint manufacturers.
2. No Paint, varnish or stain shall be reduced or applied in any way except as herein specifically called for, or recommended by the manufacturer.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. The number of coats called for in the Painting Schedules included in this specification are the minimum number required. Additional coats may be required to achieve the desired finish.

H. The drawings reference the Painting Schedules included in this specification through the use of a note that references the Paragraph Number of the Schedule and the Painting Paragraph Letter Designation, i.e. **3.9A** references **Painting Schedule - Exterior Surface** and that the surface is **Ferrous Metal.**

I. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

J. Prime back surfaces of interior and exterior woodwork with primer paint, type as recommended by manufacturer.

K. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.7 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. See Divisions 21 – 23 and 25 – 28 for other items requiring painting.

B. Paint interior surfaces of air ducts and convector heating cabinets that are visible through grilles and louvers with one) coat of flat black paint, to limit of sight line. Paint dampers exposed behind grilles to match face panels. Paint all new interior and exterior exposed ductwork and ductwork supports. Paint all new conduit, pipes and conduit/pipe supports in exposed interior and exterior locations.

C. Reinstall electrical plates, hardware, light fixture trim, and fittings removed for surface preparation or painting.

D. Do not paint factory-finished mechanical and electrical equipment.

3.8 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed or spattered.

B. During progress of Work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove from site daily.

3.9 PAINTING SCHEDULE – EXTERIOR SURFACES:

A. Ferrous Metal
1st coat – Acrylic Low Sheen Primer
2nd and 3rd coats – 100 percent Acrylic Semi-Gloss

B. Ferrous Metal (Industrial)
1st coat – Epoxy Primer
2nd and 3rd coats – Aliphatic Urethane Gloss Enamel
For use at exterior metal architectural features/exposed structure

C. Galvanized Metal (Handrail and Guardrail Assemblies only)
1st coat – Etch Prep
2nd coat – Epoxy Satin Primer
3rd and 4th coats – High Dispersion Pure Acrylic Polymer

D. Galvanized Metal and Aluminum (Except Handrail and Guardrail Assemblies)
1st coat – Etch Prep
2nd coat – Acrylic Low Sheen Primer
3rd and 4th coats – 100 percent Acrylic Semi-Gloss

E. Exposed Concrete and Cement Plaster System with Cementitious Finish Coat
1st coat – Acrylic Flat Primer
2nd and 3rd coats – Elastomeric Flat

F. Cement Plaster System with Acrylic Finish Coat
1st coat – Acrylic Flat Primer
2nd and 3rd coats – Elastomeric Flat

G. Wood
1st coat – Acrylic Flat Primer
2nd and 3rd coats – 100 percent Acrylic Flat

H. Wood
1st coat – Acrylic Flat Primer
2nd and 3rd coats – 100 percent Acrylic Semi-Gloss

I. Pressure Treated Wood
1st coat – Acrylic Flat Primer
2nd and 3rd coats – 100 percent Acrylic Satin

J. Masonry (CMU)
1st coat – Acrylic Block Filler Primer
2nd and 3rd coats – Elastomeric Flat

3.10 PAINTING SCHEDULE – INTERIOR SURFACES:

A. Gypsum Board
1st coat – PVA Primer Sealer
Texture by Section 09 29 00 Contractor
2nd coat – PVA Primer Sealer – Tint towards final color.
3rd and 4th coats – 100 percent Acrylic Semi-Gloss

B. Interior Cement Plaster
1st coat – PVA Primer Sealer
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel

C. Gypsum Board (Whiteboard Finish)
1st coat – PVA Primer Sealer
Texture by Section 09 29 00 Contractor (Level 5)
2nd coat – Acrylic Flat Primer
3rd coat – 2-Part Solvent Based Dry-Erase Coating

D. Wood (Opaque Finish)
1st coat – Acrylic Flat Primer – Tint towards final color.
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss

E. Interior Ferrous Metal
1st coat – Acrylic Low Sheen Primer – Tint towards final color.
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel
Typical paint system at all hollow metal doors, pressed metal frames, and exposed steel structure.

F. Concrete
1st coat – Acrylic Flat Primer – Tint towards final color
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss

G. Masonry (CMU)
1st coat – Acrylic Block Filler Primer
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss

H. Wood (Transparent Finish)
1st coat – Oil-based Interior Wood Stain
2nd coat – Oil-based Interior Sanding Sealer
3rd and 4th coats – Oil-based Interior Wood Varnish – Semi-Gloss

I. Galvanized Metal, Zinc Alloy Metal and Aluminum
1st coat – Etch Prep
2nd coat – Acrylic Low Sheen Primer – Tint towards final color.
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel

PAINTING SCHEDULE

APPLICATION	TYPE	MPI Gloss Level	MANUFACTURER	PRODUCT NUMBER
PRIMERS				
Exterior Ferrous Metal	Acrylic	G2	Kelly-Moore	5725
Exterior Ferrous Metal (Industrial)	Epoxy	G6	Rust-oleum	9103
Exterior Galvanized Metal and Aluminum (Except Handrail and Guardrail Assemblies)	Acrylic	G2	Kelly-Moore	5725
Exterior Galvanized Metal (Handrail and Guardrail Assemblies Only)	Epoxy	G4	Tnemec	L69
Exterior Wood and Pressure Treated Wood	Acrylic	G1	Kelly-Moore	255
Exterior Cement Plaster and Concrete; and Interior Concrete	Acrylic	G1	Kelly-Moore	247
Exterior Cement Plaster System with Acrylic Finish Coat	Acrylic	G1	Kelly-Moore	250
Exterior and Interior Masonry (Block Filler)	Acrylic	G1	Kelly-Moore	521
Interior Gypsum Board& Cement Plaster	PVA	G1	Kelly-Moore	971
Interior Wood	Acrylic	G1	Kelly-Moore	973
Interior Ferrous Metal	Acrylic	G2	Kelly-Moore	5725
Interior Aluminum, Ferrous & Galvanized Metal	Acrylic	G2	Kelly-Moore	5725
Interior Gypsum Board (Dry-Erase)	Acrylic	G1	Kilz	Premium Primer
FINISHES				
Exterior Ferrous & Galvanized Metal, Aluminum, Wood and Pressure Treated Wood (Except Handrail and Guardrail Assemblies)	100 percent Acrylic	G5	Kelly-Moore	1250
Exterior Ferrous Metal (Industrial)	Aliphatic Urethane Enamel	G6	Rust-oleum	3300
Exterior Galvanized Metal (Handrail and Guardrail Assemblies Only)	High Dispersion Pure Acrylic	G5	Tnemec	1029
Exterior Cement Plaster, Concrete, and CMU	Elastomeric	G1	Kelly-Moore	1128
Exterior Wood and Masonry	100 percent Acrylic	G1	Kelly-Moore	1240A
Exterior Pressure Treated Wood	100 percent Acrylic	G4	Kelly-Moore	1245A
Interior Gypsum Board, Wood, Masonry (CMU) and Concrete	100 percent Acrylic	G5	Kelly-Moore	1650
Interior Gypsum Board (Dry-Erase Finish)	2-Part Solvent		FUZE	WHITE
Interior Ferrous & Galvanized Metal and Aluminum	100 percent Acrylic Enamel	G5	Kelly-Moore	1685
Interior Plaster (existing and new)	100 percent Acrylic Enamel	G5	Kelly-Moore	1685

MISCELLANEOUS				
Interior Wood Stain	Oil-based	G1	Old Masters	11101
Interior Sanding Sealer	Oil-based	G1	Old Masters	45004
Interior Wood Varnish	Oil-based Polyurethane Semi-Gloss Finish	G5	Old Masters	495
Exterior Heavy-Duty Cleaner	Water Based	-	Jasco	Prep & Prime
Exterior & Interior Galvanized Metal Etch Prep.	Water Based	-	Jasco	Prep & Prime

END OF SECTION

SECTION 10 11 23 – TACKABLE SURFACES

1. GENERAL

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division –1 Specifications sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of wall coverings required is indicted on drawing and in schedules.

B. Types of wall covering required include the following:

1. Vinyl-coated fabric tackable wall panels (VFTW).

a. Vinyl-covered trim for VFTW.

1.3 QUALITY ASSURANCE:

A. Manufacturer: Provide each type of wall covering as produced by a single manufacturer, including recommended primers, adhesives sealants, and trim.

B. Installers: A firm specializing in wall covering work with not less than three years of experience in installing wall coverings similar to those required for this project.

C. Fire Hazard Classification for Vinyl Wall Covering per CBC 803.1.2: Provide materials bearing UL label and marking, indicting fire hazard classification of wall covering, as determined by ASTM E 84 or UL 723.

1. Flame spread not more than 25.

2. Fuel contributed not more than 15.

3. Smoke developed not more than 25.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data and installation instructions for VFTW, trim, and installation materials.

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For adhesives, documentation indicating that products:

a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 (2022 California Green Building Standards Code).

b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.

2. Product Data: For smaller unit sizes of adhesives (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):

a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

C. Samples: Submit full width samples (12" x 12" minimum) of VFTW, illustrating range of color and pattern variation; submit sets of sample moldings.

D. Certification: Submit manufacturer's certification that materials furnished comply with requirements specified.

E. Maintenance Instructions: Submit manufacturer's printed instructions for maintenance of installed work, including precautions for use of cleaning materials which could damage wall coverings.

F. Replacement Materials: After completion of work, deliver to project site not less than 6 linear yards of each type, color, and pattern of wall covering installed. Furnish replacement materials from same production run as materials installed.

1.5 DELIVERY AND STORAGE:

A. General: Comply with instructions and recommendations of manufacturer and as herein specified.

B. Deliver materials to project site in original packages containers clearly labeled to identify manufacturer, brand name, quality or grade, and fire hazard classification.

C. Store materials in original undamaged packages or containers. Do not store rolled goods in upright position. Maintain temperature in storage area above 40 degrees F (4 degrees C).

1.6 JOB CONDITIONS:

A. Maintain constant minimum temperature of 60 degrees F (16 degrees C) at areas of installation for at least 72 hours before and 48 hours after application of materials.

B. Illuminate areas of installation using buildings permanent lighting system, temporary lighting alone will not be acceptable.

2. PRODUCTS

2.1 VINYL COATED FABRIC TACKABLE WALL PANELS (VFTW), (VFTW-F)

A. General comply with manufacturer's specifications and installation recommendations.

B. Manufacturer

1. Koroseal School Collection: as manufactured by one of the following:
   a. Chatfield Clarke Co. (909) 823-4297 www.chatfield-clarke.com
   b. Lamvin Inc. (760) 806-6400 www.lamvin.com
   c. Tri-Best Visual Display (909) 980-9802 www.tri-best.com
   d. ABC School Equipment (951) 817-2200 www.pvsusa.com
   e. Claridge Products Solutions (510) 351-8183 www.claridgeproducts.com
2. Size: ½" x 4' - 8'-0", 9'-0", 10'-0" or 12'-0".
3. Backing: ½" Calendered Clay Coated Wood Fiber Panels (www.bpcan.com) (Factory installed).
4. Vinyl (Class A per 2022 CBC Section 803.7): 18 oz Koroseal Harborweave II School Collection; #2121-14 Winter Mist.

2.2 ACCESSORY ITEMS:

A. Adhesives: Provide manufacturer's recommended adhesive, primer, and sealer, produced expressly for use with selected wall coverings on substrate as shown on drawings. Provide materials which are mildew resistant and nonstaining to wall covering.

B. Trim: Provide manufacturer's recommended vinyl covered trim as shown on the drawings.

3. EXECUTION

3.1 PREPARATION:

A. Acclimatize wall covering materials by removing from packaging in area of installation not less than 24 hours before application.

B. Remove switch plates, wall plates, and surface-mounted fixtures in areas where wall covering is to be applied.

C. Test substrate with electronic moisture meter to verify that surfaces to be covered do not exceed 4% moisture content.

3.2 INSTALLATION:

A. Vinyl Coated Fabric Tackle Wall Panels

1. General:

a. Conditioning Vinyl Tackboard: all packages or stacks shall be opened and the Vinyl Tackboard placed around the room for at least 24 hours before application.

b. Base Wall: Vinyl Tackboard shall be installed over a solid backing, such as gypsum wallboard or plywood. Surfaces shall be clean and dry. Vinyl Tackboard shall not be applied over open framing members.

c. Adhesive Application: To the back side of each piece of Vinyl Tackboard, apply adhesive by either of following methods:

1. Notched Trowel: Apply adhesive in 4" wide ribbons along the edges and down the middle using a notched trowel with 1/4" deep notches spaced ½" o.c.

2. Cartridge: Apply adhesive in continuous ¼" to 3/8" beads starting at one edge of the board and 16" o.c.

d. Vinyl Tackboard Application

1. Place tackboard vertically against the base of the wall and hold a maximum of ¼" off the finished floor. Fasten each board with 6d nails spaced 8" o.c. along the top and bottom of each sheet or as detailed. Clean off any adhesive from vinyl surface immediately with mild soap and water.

2. Install trim where shown on the drawings per the manufacturer's written instructions.

2. Where wrapped beveled edge tackboard is used, temporary bracing must be used to assure contact between the base wall and the tackboard until the adhesive is set (4 to 6 hours).

3.3 ADJUST AND CLEAN:

A. Replace removed plates and fixtures; verify cut edges of wall coverings are completely concealed.

B. Remove surplus materials, rubbish, and debris resulting wall covering installation upon completion of work, and leave areas of installation in neat, clean condition.

3.4 EXTRA STOCK: Deliver stock of maintenance material to Owner. Furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.

A. Vinyl Coated Tackable Wall Covering: Furnish quantity of full size units equal to 1% of amount installed.

B. Trim: Furnish quantity of full length of each type of vinyl-covered trim equal to not less than 1% of amount installed.

END OF SECTION 10 11 23

SECTION 10 14 00 – SIGNAGE AND GRAPHICS

1. GENERAL:

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division –01 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Accessibility Signs meeting the requirements of Title 24 California Accessibility Standards and the Americans with Disabilities Act. Signs required in this project are as follows and are shown on the drawings:

1. Room Identification Signs
2. Toilet Room Door Symbols
3. Exterior Entrance Sign
4. Assistive Listening System Sign
5. Tactile Exit Signs
6. International Symbol of Accessibility Sign

B. Parking Lot Accessibility Signs meeting the requirements of Title 24 California Accessibility Standards and the Americans with Disabilities Act. Signs required in this project are as follows and are shown on the drawings:

1. “Tow Away” Sign
2. Accessible Parking Space Sign
3. Van Accessible Parking Space Sign

C. Room Capacity Signs

D. Applied Letters and Numbers

E. Acrylic Wall Mural

1.3 QUALITY ASSURANCE:

A. Manufacturer’s Data: Provide complete manufacturer’s data, including installation instructions and details to contractor’s job Superintendent, to facilitate coordination of work.

B. All Signage must be field inspected after installation per CBC 11B-703.1.1.2.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer’s descriptive literature and specifications, including color samples of materials for applicable approval.

B. Samples: Submit full size sample sign of each type, style, and color specified including method of attachment.

C. Shop Drawings: Submit shop drawings showing sign styles, compliance with California Title 24 Accessibility Standards (where applicable), lettering, locations, and overall dimensions.

D. Certification: Submit manufacturer’s certification that all signs furnished for project comply with requirements specified herein.

PRODUCTS:

2.1 ACCESSIBILITY SIGNS:

A. Signs shall be as shown and detailed on the drawings.

B. PLAQUE MATERIAL:

1. One piece Melamine plastic laminate with a color contrasting core. Added-on and/or engraved characters are unacceptable.
2. Non-static, fire-retardant, and self-extinguishing.
3. Impervious to most acids, alkalies, alcohol, solvents, abrasives, and boiling water.

C. RAISED (TACTILE) LETTERS AND NUMBERS:

1. Sans-serif uppercase characters
2. Horizontal format
3. Raised 1/32” from sign plate face
4. 5/8” (min.) to 2" (maximum) high based on the height of the uppercase letter “I”.
5. Character proportions shall be selected from fonts where the width of the uppercase letter “O” is 60 percent minimum and 110 percent maximum of the height of the uppercase letter “I”.
6. Stroke thickness of the uppercase letter “I” shall be 15 percent maximum of the height of the character.
7. Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8 inch minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch minimum and 4 times the raised character stroke width maximum at the base of the cross section, and 1/8 inch minimum and 4 times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch minimum.
8. Line spacing: Spacing between the baselines of separate lines of raised characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.
9. Raised characters shall be duplicated in Braille complying with the following requirements.

D. CALIFORNIA CONTRACTED GRADE 2 BRAILLE:

1. Domed or rounded shape.
2. Indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns, and names, individual letters or the alphabet, initials, or acronyms.
3. Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be placed below the entire text. Braille shall be separated 3/8 inch (minimum) and 1/2 inch (maximum) from any other tactile characters and 3/8 inch (minimum) from raised borders and decorative elements.
4. Dot base diameter: 0.059 inches (minimum) to 0.063 inches (maximum).

5. Distance between two dots in the same cell (measured center to center): 0.100 inches.
6. Distance between corresponding dots in adjacent cells (measured center to center): 0.300 inches.
7. Dot height: 0.025 inches (minimum) to 0.037 inches (maximum).
8. Distance between corresponding dots from one cell directly below (measured center to center): 0.395 inches (minimum) to 0.400 inches (maximum).

E. COLOR/FINISH:

1. Color of signs shall match signs already on site and as indicated in the approved drawings.
2. Finish shall be non-glare.

F. DECORATIVE LOGO:

1. Digitally print decorative logo shown on sign details in drawings directly to the surface of the sign with UV Flatbed Direct Print Technology.

2.2 ROOM CAPACITY SIGNS:

A. Signs shall be 18” wide x 6” high x 1/8” thick

B. Signs shall have the following characteristics:

1. Characters shall be raised 1/32” from sign plate face.
2. Signs shall be of one-piece construction; added-on and/or engraved characters are unacceptable.
3. Wording for the sign is shown on the drawings.
4. Sign shall have a ½” outside radius at corners
5. All characters shall contrast with their background – either light characters on a dark background or dark characters on a light background. Characters and background shall have a matte finish.

C. PLAQUE MATERIAL:

1. Melamine plastic laminate with a color contrasting core.
2. Non-static, fire-retardant, and self-extinguishing.
3. Impervious to most acids, alkalies, alcohol, solvents, abrasives, and boiling water.

D. LETTERS AND NUMBERS:

1. Sans-serif uppercase characters
2. Characters shall be beveled
3. 1/2” (min.) high
4. Width-to-height ratio between 3:5 and 1:1
5. Stoke width-to-height ratio between 1:10 and 1:5
6. Character spacing shall be 1/8” (min.) to 3/8” (max.) between two adjacent characters measured at top surface.

E. COLOR:

1. Color of signs shall be selected by architect from the manufacturer's standard color palette.

2.3 PARKING LOT ACCESSIBILITY SIGNS:

A. Signs shall be as shown and detailed on the drawings.

B. Material: 14 gauge (min.) galvanized steel

C. Text on sign shall be black capital sans serif letters on white baked enameled background. Size of letters shall be as shown on the drawings.

D. White reflectorized International Symbol of Accessibility where shown on sign details on drawings shall be 6" high (min.) on a light blue porcelain background. Blue will be equal to Color No. 15090 per Federal Standard 595C.

2.4 APPLIED LETTERS AND NUMBERS:

A. Manufacturer: Gemini Incorporated
103 Mensing Way
Cannon Falls, MN 55009
(800) 538-8377
www.signletters.com

B. Style: Standard Cast Metal Letters

C. Material: Cast Aluminum.

D. Size: Shown on Drawings

E. Exterior Font: Uppercase Helvetica Light

F. Interior Font: Uppercase Times Bold

E. Hardware: 3" long metal threaded studs

F. Text and Location as shown on drawings

G. Color of letters and numbers shall be selected by architect from the manufacturer's standard color palette.

2.5 ACRYLIC WALL MURAL

A. Impact-modified Extruded Acrylic: High Density Polyethylene (HDPE); chemical and corrosion resistant with UV inhibitors.

1. Thickness: ½-inch
2. Acrylic Color: Clear
3. Edges: Laser Polished

B. Die Cut Vinyl Film: High quality 3M, Arion, or Oracle Vinyl for indoor and outdoor use and printed with fade-resistant UV inks.

1. Die Cut Vinyl Film Color: Selected by Architect from Manufacturer's standard color palate.

C. Acryl Panel Fabrication: From computerized vector file provided by architect and cleaned up for fabrication purposes, laser cut acrylic to shapes shown on approved drawings. To prevent cracking during shipment and installation, provide a slight radius of 0.05-inch (minimum) on all inside and outside corners.

D. Vinyl Die-cut Application:

1. Clean and Prepare acrylic to receive vinyl application.
2. Adhere self-adhering colored vinyl to back side of acrylic panels where indicated on the approved drawings.
3. Remove all air bubbles and trim vinyl to edge as required.

E. Stand-off: C.R. Laurence Co.; 1" dia. x 2" long Standoff System in brushed stainless steel with stainless steel cap, 2 nylon washers, and self-drilling self-tapping ¼-20 x 1 ½" SMS.

3. EXECUTION

3.1 GENERAL

A. Field Conditions: Inspect field condition for suitability of proper installation. Inform contractor of conditions requiring attention.

3.2 INSTALLATION

A. Locate sign and mural units where indicated on drawings, using mounting methods of the type described and in compliance with manufacturer's instructions and as indicated on drawings.

B. Install signs and mural units level, plumb, and at heights indicated on drawings.

C. Attach and secure signs to walls, doors, poles, fences, or glass with appropriate screws and adhesives or as indicated on drawings.

END OF SECTION 10 14 00

SECTION 10 21 13 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-polymer toilet compartments configured as toilet enclosures.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of cutouts for compartment-mounted toilet accessories.
2. Show locations of centerlines of toilet fixtures.

C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

D. Product Certificates: For each type of toilet compartment, from manufacturer.

E. Independent lab test reports indicating compliance with NFPA 286.

F. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 75 or less.
2. Smoke-Developed Index: 450 or less.

B. HDPE Materials shall be tested in accordance with NFPA 286 and shall comply with the acceptance criteria listed in CCR Title 24 Part 2, California Building Code Section 803.1.2.1.

C. Regulatory Requirements: Comply with applicable provisions in CCR Title 24, Part 2, California Building Code - Accessibility Standards as enforced by DSA for toilet compartments designated as accessible.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.

B. Aluminum Extrusions: ASTM B 221.

C. Brass Castings: ASTM B 584.

D. Brass Extrusions: ASTM B 455.

E. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

F. Stainless-Steel Castings: ASTM A 743/A 743M.

G. Zamac: ASTM B 86, commercial zinc-alloy die castings.

H. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 SOLID-POLYMER UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Santana Products, Inc.
2. Comtec Industries.
3. Capitol Partitions.
4. Accutec Manufacturing.
5. Laminating Technologies
6. Global Steel Products Corp.

B. Toilet-Enclosure Style: Overhead braced.

C. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

1. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
2. Side panel of Accessible Toilet Compartment for Children Use: Provide a toe clearance of 12 inches minimum above finish floor and 6 inches deep beyond the compartment-side face of the partition, exclusive of partition support members. Partition components at toe clearance shall be smooth without sharp edges or abrasive surfaces.
3. Color and Pattern: Paisley (black with white specks or flakes).

D. Pilaster Shoes: Manufacturer's standard design (modified as required to ensure that height of shoe covers screw heads at low point of floors); stainless steel.

E. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum.

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Manufacturer's standard chrome plated non-ferrous metal, clear anodized aluminum or stainless steel.
2. Hinges: Manufacturer's standard continuous, spring-loaded or gravity type, adjustable to return to a closed position.
3. Slide latch and Keeper: Manufacturer's standard surface-mounted slide latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mounting height between 34 inches and 44 inches above finish floor. Coordinate location with Door Pull.
4. Coat Hook at 48 inches above finish floor: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Pull: Manufacturer's standard U-pull units on both sides of doors between 34 inches and 44 inches above finish floor set immediately below the Slide latch and Keeper.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel with theft-resistant-type heads. Provide stainless steel sex-type bolts for through-bolt applications. All toilet compartment doors shall be through bolted to the hinges and the hinges to the pilasters with stainless steel sex-bolts. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments. Doors at side entry accessible stalls shall be in-swinging and shall have 34 inch minimum clear opening width when the door is open 90 degrees.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions as submitted to and approved by Architect. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices and as detailed on the drawings.

1. Maximum Clearances:

    a. Pilasters and Panels: 1/2 inch.
    b. Panels and Walls: 1 inch.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on accessible toilet stall doors to return doors to fully closed position.

END OF SECTION 10 21 13

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Hand dryers.
3. Underlavatory guards.
4. Custodial accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Samples: For each exposed product and for each finish specified, full size.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on approved drawings.
2. Identify accessories using designations indicated on approved drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: **Seven** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist 360 lbf applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser (Student Restrooms – Standard Toilet Stall):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Pioneer Chemical Company; EC200DLZNC** or comparable product by one of the following:

a. Architect and District approved equal.

2. Description: Vandal Resistant Double-roll toilet tissue dispenser.
3. Mounting: Surface mounted.
4. Operation: Slow down dispensing of tissue with wide steel cross-bar.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: 3/8” thick galvanized steel.
7. Accessories: **Keyed-Alike Padlock**

B. Toilet Tissue (Roll) Dispenser (Staff Accessible Restrooms, Public & Staff Accessible Toilet Stalls and Student Accessible Toilet Stall):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-3888** or comparable product by one of the following:

a. Architect and District approved equal.

2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Recessed.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. Toilet Tissue (Roll) Dispenser (Public & Staff Toilet Stalls):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-2888** or comparable product by one of the following:

    a. Architect and District approved equal.

2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Surface Mounted.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

D. Paper Towel (Roll) Dispenser (Classrooms):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **San Jamar; T950** or comparable product by one of the following:

    a. Architect and District approved equal.

2. Description: Lever-actuated mechanism permitting controlled delivery of paper rolls in preset lengths.
3. Mounting: Surface mounted.
4. Minimum Capacity: 8-inch- wide, 800-foot- long roll.
5. Material and Finish: Impact-resistant plastic construction with translucent front cover.

    a. Color: District selected from Manufacturer's Standard Color Chart. (or Arctic Blue (suffix TBL) or Black Pearl (suffix TBK))

6. Lockset: Tumbler type.

E. Combination Towel (Roll) Dispenser/Waste Receptacle (Cafeteria Kitchen):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 046921-9** or comparable product by one of the following:

    a. Bobrick
    b. Architect and District approved equal.

2. Description: Combination unit for dispensing preset length of roll paper towels, with removable waste receptacle.
3. Towel Mechanism: Lever.
4. Mounting: Surface mounted.
5. Minimum Towel-Dispenser Capacity: 8-inch- wide, 800-foot- long roll.
6. Minimum Waste Receptacle Capacity: 12 gal.
7. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
8. Liner: None.
9. Lockset: Tumbler type for towel dispenser compartment and waste receptacle.

F. Soap Dispenser:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **GOJO**®; **FMX-20** or comparable product by one of the following:

    a. Architect and District approved equal.

2. Description: Designed for manual operation and dispensing soap in foam form.

3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 2000 mL.
5. Materials: Durable ABS Plastic with rugged polycarbonate view windows.
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

G. Grab Bar (Accessible Toilet (36” long):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 3801** or comparable product by one of the following:

    a. Bobrick
    b. Architect and District approved equal.

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 18 gauge thick.

    a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: Straight, 36 inches long.

H. Grab Bar (Accessible Toilet Room or Stall (48” long)):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 3801** or comparable product by one of the following:

    a. Bobrick
    b. Architect and District approved equal.

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 18 gauge thick.

    a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: Straight, 48 inches long.

I. Sanitary-Napkin Disposal Unit (Girls Standard Toilet Stall):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Hospeco; ND-1E** or comparable product by one of the following:

    a. Architect and District approved equal.

2. Mounting: Surface mounted.
3. Door or Cover: Hinged Cover and Hinged Bottom (for easy removal of filled liner).
4. Receptacle: Fixed.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

J. Sanitary-Napkin Disposal Unit (Girls Accessible Toilet Staff and Staff Toilet Room):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-353** or comparable product by one of the following:

a. Architect and District approved equal.

2. Mounting: Recessed.
3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
4. Receptacle: Removable, leak-proof, rigid molded polyethylene with a capacity of 1.2 gallons.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

K. Seat-Cover Dispenser (Staff Toilet Rooms):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Hospeco; HG-1-2** or comparable product by one of the following:

a. Architect and District approved equal.

2. Mounting: Surface Mounted
3. Minimum Capacity: two sleeves of 250 half-fold seat covers.
4. Exposed Material and Finish: Styrene Plastic.

L. Mirror Unit (Staff Toilet Rooms):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 0600-C** or comparable product by one of the following:

a. Architect and District approved equal.

2. Material: Stainless steel, 20 gauge thick.

a. Finish: Smooth, ASTM A480/A480M No. 8 finish (mirror).

3. Size: 18” wide x 36” high.
4. Hangers: Manufacturer's standard rigid.

M. Mirror Unit (Student Toilet Rooms):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 0600-C** or comparable product by one of the following:

a. Architect and District approved equal.

2. Material: Stainless steel, 20 gauge thick.

a. Finish: Smooth, ASTM A480/A480M No. 8 finish (mirror).

3. Size: 42” wide x 36” high.
4. Hangers: Manufacturer's standard rigid.

2.3 HAND DRYERS

A. High-Speed Air Dryer:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Excel Dryer Inc.; Xlerator XL-SB w/ ADA-Compliant Recess Kit and HEPA Filtration System** or comparable product by one of the following:

a. Architect and District approved equal.

2. Description: High-speed, warm-air hand dryer for rapid hand drying.
3. Mounting: Semirecessed.

a. Protrusion Limit: Installed unit protrudes maximum 4 inches from wall surface.

4. Operation: Infrared-sensor activated with timed power cut-off switch.

a. Average Dry Time: 8 seconds.
b. Automatic Shut Off: At 35 seconds.

5. Sound Level: Adjustable 65-75 dB.
6. Heat Range: Adjustable 72°F - 135°F
7. Cover Material and Finish Stainless steel, ASTM A480/A480M No. 4 finish (satin).
8. Electrical Requirements: 110 to 120 V, 11.3 to 12.2 A, 1240 to 1450 W or 208 to 277 V, 5.6 to 6.2 A, 1160 to 1490 W.

2.4 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Truebro, an IPS Corporation; Lav Guard® 2E-Z** or comparable product by one of the following:

a. Architect and District approved equal.

2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded vinyl, white.

2.5 CUSTODIAL ACCESSORIES

A. Custodial Mop and Broom Holder:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 1315** or comparable product by one of the following:

a. Architect and District approved equal.

2. Description: **Unit with shelf, hooks, holders, and rod suspended beneath shelf**.
3. Length: **36 inches**.
4. Hooks: Three.
5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

a. Shelf: Not less than nominal 18-gauge thick stainless steel.
b. Rod: Approximately 3/8” diameter stainless steel.

2.6 MATERIALS

A. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

2.7 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of **six** keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions and per approved details, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements and per approved details.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 28 00

SECTION 22 05 10 - PLUMBING GENERAL PROVISIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. References.
B. Description of Work.
C. Drawings and Specifications.
D. Industry Standards and Codes.
E. Site Examination.
F. Permits, Fees and Utility Connections.
G. Coordination of Work.
H. Progress of Work.
I. Submittals
J. Operation and Maintenance Manuals.
K. Project Record Documents.
L. Warranty.
M. Quality and Care
N. Access Doors.

1.2 RELATED SECTIONS

A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the plumbing systems.
C. The requirements of this Section apply to all Work of Division 22.
D. Section 01 33 00 - Submittals.
E. Section 01 40 00 - Quality Requirements.
F. Section 01 77 00 - Closeout, for closeout submittals.

1.3 REFERENCES

A. ANSI - American National Standards Institute.
B. ASTM - American Society for Testing Materials.
C. CEC - California Electric Code.
D. NEMA - National Electric Manufacturers' Association.
E. NFPA - National Fire Protection Association.
F. OSHA - Occupational Safety and Health Act.
G. UL - Underwriters' Laboratories.
H. See detailed References that are listed in individual sections.

1.4 DESCRIPTION OF WORK

A. The work included in this division of the specifications consists of furnishing labor, tools, equipment, supplies and materials, unless otherwise specified, and in performing operations necessary for the installation of the complete Plumbing System as required by these specifications or shown on the Drawings, subject to the terms and conditions of the Contract Agreement.

B. The work shall also include the completion of details of plumbing work not mentioned or shown which are necessary for the successful operation of plumbing systems described on the drawings or required by these specifications. Furnish and install any incidental work not shown or specified which is required to provide a complete and operational system.

1.5 DRAWINGS AND SPECIFICATIONS

A. Drawings are schematic and diagrammatic. Drawings indicate the general arrangement of equipment, piping, and other plumbing work. Use judgement and care to install plumbing work to fit the job conditions within the building construction and finishes, and to function properly.

B. The Contractor shall investigate the building conditions affecting the Work and shall arrange his work accordingly providing offsets, fittings, valves and accessories to fit the actual job conditions. The Contractor shall be responsible to field measure and confirm new and existing plumbing systems locations with respect to other architectural, structural, mechanical and electrical work, existing and new. Do not scale distances off of the plumbing drawings. Use actual building dimensions.

C. The drawings and specifications are complimentary each to the other. What is required by one shall be as binding as if called for by both.

D. Examine all drawings and specifications prior to bidding the Work. Report any discrepancies to the Engineer.

1.6 INDUSTRY STANDARDS AND CODES

A. The Plumbing Contractor shall comply with the latest provisions of all codes, regulations, laws and ordinances applicable to the work involved. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such codes, regulations laws and ordinances.

B. All materials, products, devices, fixtures forms or types of construction included in this project shall meet or exceed the published requirements of the publications listed below. These publications form a part of this specification.
   1. California Building Code, 2022.
   2. California Mechanical Code, 2022.
   3. California Plumbing Code, 2022.
   4. California Electrical Code, 2022.
   5. National Fire Protection Association.
   6. California Fire Code, 2022.
   7. California State Fire Marshal.
   8. Occupational Safety and Health Administration, including CAL-OSHA.
   9. State of California Energy Conservation Standards.
   10. State of California Code of Regulations, Title 24.
   11. Other applicable state laws.

C. Nothing in the Drawings or Specifications shall be construed to permit work that does not conform these codes. When Contract Documents differ from governing codes, furnish and install to the higher standard required at no extra charge. The Contract Documents are not intended to repeat the code requirements except where necessary for clarity.

D. No material or product installed as a part of the Work shall contain asbestos in any form.

1.7 SITE EXAMINATION

A. Contractor shall examine the site, verify dimensions and locations with Drawings, check utility connection locations, and familiarize himself with the existing conditions and limitations. No extras will be allowed because of the Contractor's misunderstanding of the amount of work involved or his lack of knowledge of any site condition which may affect his work. Any apparent variance of the drawings or specifications from the existing conditions at the site shall be called to the attention of the Engineer immediately.

1.8 PERMITS, FEES AND UTILITY SERVICES

A. Contractor shall pay for and obtain all permits and service required in the installation of this work.

B. Contractor shall arrange for all required inspections and will secure approvals from authorities having jurisdiction.

1.9 COORDINATION OF WORK

A. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the plumbing work, and in its interface with other work and that such establishment is the exclusive responsibility of the contractor.

B. The Contractor shall give careful consideration to the work of the General, Mechanical, Electrical and other contractors on the job and shall organize his work so that it will not interfere with the work of other trades. He shall consult the drawings and specifications for work of other trades for correcting information, and the pertinent drawings for details and dimensions.

C. Arrange plumbing work in a neat, well-organized manner with the piping and similar services running parallel and/or perpendicular to primary lines of the building construction. Locate operating and control equipment properly to provide easy access, and arrange entire plumbing work with adequate access for operation and maintenance.

D. Verify the location of all equipment, air distribution devices, etc. and if interference develops, the Owner/Engineer's decision will be final and no additional compensation will be allowed for the moving of misplaced air devices or equipment.

1.10 PROGRESS OF WORK

A. This Contractor shall organize his work so that the progress of the plumbing work will conform to the progress of the other trades, and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from defective or ill-timed work performed under this section shall be borne by this Contractor.

1.11 STRUCTURAL DESIGN REQUIREMENTS AND SEISMIC RESTRAINTS

A. Plumbing systems and equipment shall be anchored and seismically braced in accordance with all applicable codes and industry standards.

B. Contractor shall design seismic bracing for all plumbing equipment and systems to comply with the 2022 California Building Code (CBC) and the latest edition of the Mason Industries "Seismic Restraint Guidelines".

1. Contractor shall submit details and calculations prepared and signed by a licensed professional structural engineer registered in the state in which the Work is performed demonstrating compliance with the above and all applicable codes.
2. Drawings, details and calculations shall be submitted to the Engineer for review. Compliance documents shall be approved by the Engineer prior to installation.

C. Plumbing systems and equipment shall include, but are not limited to, all ductwork, piping, air conditioning equipment, heating and ventilating equipment, air handlers, fans, electrical and control panels, conduits and other components.

D. Supports, anchorage and restraints for all piping and ductwork for standard installation details that comply with the latest edition of the latest edition of the Mason Industries "Seismic Restraint Guidelines", or equal, shall be used wherever possible. The Contractor shall provide all supporting documentation required for the Engineer and the reviewing authorities. If compliance with one of these standards is demonstrated, separate structural calculations are not required.

E. For all non-standard installations not detailed in one of the approved systems, the Contractor shall provide details of supports, anchorages and restraints with supporting calculations all stamped and signed by a licensed professional structural engineer registered in the state in which the Work is performed.

1.12 SUBMITTALS

A. See Section 01 33 00 - Submittals, for additional submittal procedures.

B. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Notice to Proceed.
   2. For products specified only by reference standards, list applicable reference standards.

C. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Shop Drawing Submittals: Prepared specifically for this Project.

E. Organize submittals in sequence according to Specification Section. Submit in bound document with tabs identifying each Specification Section. Provide a Table of Contents identifying the Specifications Sections being submitted and the contents within each tabbed section. Prepare Submittals in multiple volumes if required. Provide a complete Submittal package at one time. Do not submit individual Sections piecemeal.

F. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

G. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

H. Furnish, upon request, installation instructions for all equipment and materials to Inspector of Record prior to installation.

I. Maintain a copy of the fire and smoke damper installation instructions on site for use by the Inspector of Record.

1.13 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. Architect will consider requests for substitutions only within 7 days after date of Agreement.

C. Substitutions will not be considered when a product becomes unavailable through no fault of the Contractor.

D. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a substitution.

E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

F. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with reapproval by authorities including obtaining reapproval by authorities.

G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

H. If excessive review, as judged by the Engineer, is required caused by complicated, numerous or repetitive requests, Contractor shall reimburse Engineer and its Consultants for such review at their standard billing rates.

I. Substitution Submittal Procedure:
   1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   3. The Architect will notify Contractor in writing of decision to accept or reject request.
   4. Present each substitution individually. If a proposed substitute in not found to be acceptable, then the specified item shall be supplied.

1.14 OPERATION AND MAINTENANCE MANUALS

A. See Section 01 77 00 Closeout for Operation and Maintenance Manual requirements.

B. Provide operating and maintenance instructions, diagrams and parts lists for all components of all plumbing systems and each piece of equipment furnished under these specifications.

C. Operating and maintenance instructions shall be furnished for the following equipment and systems:
   1. Plumbing Systems.
   2. Piping Systems.
   3. Motors.
   4. Water Balance and Test Reports.

D. Provide manufacturer's model number, design data, capacities, etc. for each piece of plumbing equipment furnished as a part of the Work.

E. The operating instructions shall include procedures for starting, stopping and emergency manual operation for all equipment and systems.

F. Provide maintenance instructions of each item of individual equipment including applicable maintenance data as recommended by the manufacturer, including frequency of lubrication, lubricants, inspections required, adjustment procedures, belt and pulley sizes, etc.

G. Provide manufacturer's parts bulletins with part numbers for each item of equipment included in the Work. Parts bulletins shall be specific to the equipment provided. Extraneous information that does not apply to the equipment provided shall be eliminated from the literature.

H. Include copies of test reports (startup, check, etc.) and inspections performed for each piece of equipment provided in the Work.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Provide supplier and manufacturer contacts, telephone numbers and addresses in the front portion of the operation and maintenance manual.

1.15 PROJECT RECORD DOCUMENTS

A. See Section 01 77 00 - Closeout for Project Record Document requirements.

B. Record (As built) Drawings:
   1. Supplementing the requirements of the General Conditions and Supplementary General Conditions, As-Built Drawings shall show invert elevations of sanitary sewers, rain water leaders and storm sewers of critical locations, locations of shut-off valves and stub-outs for future, and all changes made during the course of the work. Furnish reproducible drawings when work is complete.
   2. The grade or quality of materials desired is indicated by the trade names or catalog numbers stated herein
   3. Dimensions, sizes, and capacities shown are a minimum and shall not be changed without permission of the Architect.

1.16 QUALITY ASSURANCE

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

1.17 WARRANTY

A. See Section 01 77 00 - Contract Closeout, Warranties, for additional warranty requirements.

B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 QUALITY AND CARE

A. All materials shall be new and in perfect condition when installed unless specifically indicated otherwise. Materials shall be tested within the Continental United States by an independent, nationally recognized testing agency and shall be listed in accordance with testing agency requirements. When not otherwise specified, all material shall conform to applicable National Standards (ANSI).

B. All capacities, sizes and efficiency ratings shown on the drawing are minimum. Gas meter and gas pressure reducing valve capacities are maximum allowable.

C. Each category of material or equipment shall be of the same brand or manufacturer throughout the Work wherever possible.

D. The quality of materials and equipment to be provided is defined by the brand names, manufacturers, model and catalog numbers listed on the Drawings and in the Specifications. Contractor shall provide each item listed, of the quality specified, or equal.

E. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.

F. Inspect and report concealed damage to carrier within their required time period.

G. Store materials in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect from dirt, water, construction debris, and traffic.

H. Equipment which has been damaged, exposed to weather or is, in the opinion of the Engineer or Owner, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

2.2 ACCESS DOORS

A. Coordinate access door requirements with Section 08 31 13. The more stringent requirements shall govern.

B. Provide access doors where access through floors, walls or ceilings is required to access plumbing, plumbing, control system components, fire dampers and fire alarm system components (such as smoke detectors, fire/smoke dampers, etc.) or other systems requiring access for maintenance, test or observation.

1. Access doors requiring hand access or access for observation only shall be 14"x14" minimum usable opening.

2. Ceiling access panels to be minimum 24x24 (or required and approved size).
3. Access doors where entrance of a service person may be required shall be 24"x30" minimum usable opening.

C. Established standard: Milcor of types listed below. Other acceptable manufacturers: Karp, Elmdor, In-Ryko, Acudor, or approvedequal. Comply with the following:
1. Form doors and frames of welded, ground smooth steel construction, 14 gauge for doors, 16 gauge for frames. Provide prime coat finish except for stainless steel type.
2. Concealed hinges to allow 175 degree opening.
3. Locks: flush, screw driver operated cam lock(s). Provide two keys for each set of locks provided.
4. Provide anchoring devices suitable for the construction into which the doors are framed.

D. Application (as applicable):
1. In gypsum drywall walls and ceilings: Type DW.
2. In ceramic tile walls: Type MS (stainless steel).
3. In fire rated walls: Type Fire Rated (rating as required for wall or ceiling), self closing, 250 F in 30 min. temperature rating.

PART 3 EXECUTION

3.1 INSTALLATION

A. Access Doors
1. Coordinate the exact location of access doors to provide proper access to the item concealed. Obtain written approval for access door locations from Architect.
2. Coordinate installation of access doors with the trades performing the construction assemblies into which the access doors are placed.
3. Install all access doors neatly and securely, to open and close completely, and to operate freely and without binding. Install rated doors in accordance with their listing requirements.
4. Test operate all doors and make all adjustments required for satisfactory operation. Replace all damaged materials.
5. Install in accordance with manufacturer's instructions.

3.2 OWNER-FURNISHED EQUIPMENT

A. Some equipment is to be furnished under another Contract and is indicated as such on Drawings. Rough-in for such equipment, receive, uncrate, install and connect plumbing equipment, faucets, and fixtures as furnished by others. Furnish and install stops, traps, strainers, backflow preventers, valves and other appurtenances not furnished by others in order to provide a complete operating system.

B. Comply with paragraph on Plumbing Fixtures Installation, this Section, for installation procedures.

C. Refer to plumbing fixture connection schedule on Drawings.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with the requirements within this section.

B. Test all piping with no leak or loss in pressure in accordance with the requirements within this section.

3.4 TESTING AND INSPECTION

A. See individual specification sections for additional testing and inspection required.

B. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.

4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.5 GENERAL TESTING REQUIREMENTS FOR PLUMBING SYSTEMS

A. Contractor shall assign a responsible person to be an independent representative to witness testing and to sign as witness of times, pressure and losses of testing media for all plumbing and gas piping testing.
1. Test all piping as noted below with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.
2. Submit to the Engineer for review a log of all tests made which shall include time, temperature, pressure, water makeup and other applicable readings, necessary to indicate the systems have been operated and tested in the manner outlined in the construction documents.
3. After producing the specified test pressure, disconnect the pressurizing source; do not introduce further pressure for the duration of the test period, repair leaky piping and retest. Repeat the procedure until the entire system is proven tight.

B. Testing:
1. General:
   a. Provide temporary equipment for testing, including pumps, compressors, tanks, and gauges, as required. Test piping systems before insulation (if any) is installed and remove or disengage control devices before testing. Where necessary, test sections of each piping system independently, but do not use piping valves to isolate sections where test pressures exceed local valve operating pressure rating. Fill each section with water, compressed air, or nitrogen and pressurize for the indicated pressure and time.
   b. Notify Architect and local Plumbing Inspector two days before tests.

c. Drainage, Waste and Vent Piping: Test in accordance with governing plumbing code or as follows: Test drainage and venting systems, with necessary openings plugged, to permit system to be filled with water and subjected to a water pressure of a minimum of 5 PSI head. System to hold water without a water level drop greater than 1/2 pipe diameter of largest nominal pipe size within a 24-hour period. Test system in sections if minimum head cannot be maintained in each section. The 5 PSI head to be the minimum pressure at the highest joint.
d. Water Piping: Eliminate air from system. Fill and test at 125 PSIG or minimum 1-1/2 times static pressure at connection to serving utility main for a period of two hours with no loss in pressure.
e. Send test results to Architect for review and approval.

2. Testing of Pressurized Systems:
   a. Test each pressurized piping system at 150 percent of operating pressure indicated, but not less than 125 PSIG test pressure.
   b. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 2 percent of test pressure.
   c. Test hot and cold domestic water piping systems upon completion of rough-in and before connection to fixtures at a hydrostatic pressure of 125 PSIG.
3. Gas Piping:
   a. Cap openings and test with compressed air or nitrogen. Systems to maintain test pressure for a period of 24 hours with no leaks or pressure loss.
   b. Test Pressure: 100 PSIG. Use only nontoxic soap and water or commercially approved leak detector liquids for leak detection. Testing mediums and apparatus required to be oil free.
   c. Energize and test equipment connected to piping for proper operation. Test "final" gas piping and fittings installed on equipment beyond the rough in piping for leakage using an electronic ionization gas detector. Submit a certificate indicating the completion of the prescribed testing procedure and that such equipment and piping is free from leakage. Test pressures not to exceed recommendations or instructions by manufacturers of equipment and devices.
4. Repair:
   a. Repair piping system sections which fail the required piping test by disassembly and reinstallation, using new materials to the extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
   b. Drain or purge test water, air, or nitrogen from piping system after testing and repair work have been completed.

3.6 CUTTING AND PATCHING

A. Submit written request in advance of cutting or alteration which affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

B. Execute cutting and patching to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of plumbing and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.

C. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new Products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Code requirements , to full thickness of the penetrated element.

I. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.7 PRIMING AND PAINTING

A. Apply primer to all exposed ferrous metals that are not factory primed, factory finished, galvanized, stainless steel or anodized. Exposed black steel piping shall be primed and finish painted including black steel piping located outdoors.
   1. Primer shall be as recommended by the paint manufacturer for each specific application.
   2. Acceptable Products include: Fuller O'Brien Blox-Rust Metal All Purpose Primer, equivalent Rust-Oleum product, or equal. See Section 09 90 00 for other acceptable products.

B. Apply two coats of primer to metal surfaces of items to be insulated or jacketed, except piping, or factory primed or finished.

C. Preparation:
   1. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
   2. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; seal stains and marks which cannot be completely removed using Devoe KILSTAIN primers, shellac, or other coating acceptable to paint manufacturer any marks or defects that might bleed through paint finishes.
   3. Remove or protect hardware, electrical plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings which are adjacent to surfaces to receive coatings.
   4. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to thoroughly dry.
   5. Galvanized Surfaces:
      a. Remove surface contamination and oils by solvent cleaning in accordance with SSPC-SP 1 and allow to dry.
      b. Apply Devoe MIRROLAC Galvanized Metal Primer in accordance with manufacturer instructions.
   6. Uncoated Steel And Iron Surfaces:
      a. Remove grease, rust, scale, and dust from steel and iron surfaces using solvent in accordance with SSPC-SP 1.
      b. Where heavy coatings of scale or contaminants are evident, hand tool clean in accordance with SSPC-SP 2 or use other approved SSPC SP method as needed.
   7. Shop Primed Steel Surfaces: Remove loose primer and dust. Sand and feather edges to smooth surface. Clean areas with solvent and spot prime bare metal surfaces with appropriate Devoe MIRROLAC metal primer or primer recommended by manufacturer.

D. Application:
   1. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.

2. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
3. Remove dust and other foreign materials from substrate immediately prior to applying each coat.

E. Finish Painting: See Section 09 90 00.

END OF SECTION 22 05 10

SECTION 22 10 05 - PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Chemical resistant sewer.
   3. Drains.
   4. Domestic water.
   5. Storm water.
   6. Gas.
   7. Flanges, unions, and couplings.
   8. Pipe hangers and supports.
   9. Valves.
   10. Check.
   11. Relief valves.
   12. Strainers.

B. Piping system work includes but not limited to:
   1. Aboveground soil, waste and vent piping within buildings, including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
   2. Underground building drain piping including mains, branches, traps, connections to fixtures and drains, and connections to stacks, terminating at connection to sanitary sewers 5 feet outside foundation wall.
   3. Conductor piping from roof drains to storm building drain.
   4. Storm building drain piping from conductor piping and area drains terminating at connection to storm sewers 5 feet outside foundation wall.
   5. Domestic cold water piping.
   6. Domestic hot water piping.
   7. Domestic circulating hot water piping.
   8. Specialty piping systems.
   9. Natural Gas System: Including new service connection and piping/meter assembly by serving utility company and costs/fees involving rough-in and connection to meter connections to gas equipment.
   10. Condensate drain and water piping system for plumbing equipment.
   11. Flashing and counterflashing of roof and wall penetrations required by installation of work of this Section.
   12. Furnishing and installation of access doors required for work furnished by this Section.
   13. Furnishing and installing of sleeves, inserts and anchorage required for the installation, which are embedded in work of other trades. Sleeve, wrap and seal piping in concrete.

1.2 RELATED REQUIREMENTS

A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

B. Section 07 84 13 - Firestopping.

C. Section 08 31 13 - Access Doors and Panels.

D. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

E. Section 22 07 19 - Plumbing Piping Insulation.

1.3 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).

B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.

C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; 2011.

F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; 2012.

G. ASME B31.1 - Power Piping; 2014.

H. ASME B31.9 - Building Services Piping; 2014.

I. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2015.

J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.

K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

L. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.

M. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.

N. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

O. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.

P. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

Q. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.

R. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013.

S. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.

T. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).

U. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings; 2014.

V. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2014.

W. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

X. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.

Y. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2010.

Z. AWWA C651 - Disinfecting Water Mains; 2005.

AA. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.

AB. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011.

AC. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

AD. MSS SP-67 - Butterfly Valves; 2011.

AE. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.

AF. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011.

AG. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.

AH. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.

AI. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

AJ. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

AK. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Project Record Documents: Record actual locations of valves.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with State of California, standards.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

1.6 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of California plumbing code.

B. All plumbing piping, valves, etc. shall comply with State of California SB 1953 to be certified as lead free.

C. Conform to applicable code for installation of backflow prevention devices.

D. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: CISPI 301, hubless.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310 with MG couplings.
   3. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies. Heavy duty, Husky SD4000, .015 inch thick 304 stainless steel shield, 4-band coupling.

2.3 SANITARY SEWER AND VENT PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

B. Copper Tube: ASTM B 306, DWV or ASTM B 88 (ASTM B 88M), Type M (C), Drawn (H).
   1. Application: Condensate drains.
   2. Fittings: ASME B16.29, wrought copper, or ASME B16.23, sovent.
   3. Joints: ASTM B32, alloy Sn50 solder.

2.4 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET **OF BUILDING**

A. Copper Pipe: ASTM B 42, hard drawn, Type K.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   2. Joints: AWS A5.8, BCuP silver braze. Approved Fillers: "Phos 0," "Silfos 5," "Aircosil 15," "Braze 450(DE)." Use appropriate flux per manufacturer's recommendations.

2.5 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: For sizes 2-1/2" and smaller, ASTM B 32, alloy Sn95 solder.
   3. Joints: For sizes 3" and larger, AWS A5.8, BCuP5 silver braze.
   4. Pressure Range 81 to 150 PSI and Temperatures 151F to 200F: 95/5 tin-antimony or silver-bearing solders, i.e., Allstate 430, Harris Stay Brite 5 or 8.

B. Provide full solder cup for all fittings.

C. Schedule 40 Screwed Brass: Capped or plugged outlets.

2.6 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies. Heavy duty, Husky SD4000, .015 inch thick 304 stainless steel shield, 4-band coupling.

2.7 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.8 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Schedule 40, A53 black steel pipe and threaded malleable fittings 2 1/2 inches and smaller. Welded pipe 3 inches and larger. Pipe below grade wrapped with double thickness Scotchwrap No. 51 applied over Scotchwrap pipe primer. Factory applied epoxy coating to equivalent thickness with field wrapped or epoxied joints approved. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.

B. Polyethylene Pipe: ASTM D2513, SDR 11.
   1. Fittings: ASTM D2683 or ASTM D2513 socket type.
   2. Joints: Fusion welded.
   3. Pipe below grade shall have an insulated copper tracer wire installed adjacent to underground nonmetallic gas piping. Tracer wire insulation: yellow. Tracer wire shall meet requirements of CPC 1211.19.

2.9 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASTM A234/A234M, wrought steel welding type.
   2. Joints: ASME B31.1, welded.
   3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.10 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Pipe size 2-1/2" and smaller: Malleable iron threaded fittings.

2. Pipe size 3" and larger: Steel butt welded fittings.
3. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
4. Joints: Threaded or welded to ASME B31.1.
5. Black steel piping exposed outdoors shall be painted. Refer to Sections 23 05 10 and 09 90 00.

2.11 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 2 Inches and Under:
1. Steel Pipe Union: 150 PSI malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe.
2. Copper Pipe Union: 200 PSI working pressure. Bronze body, solder or grooved ends. Pipes 2 inches and under use ground joint, pipes 2-1/2 inches and larger use flanged face or grooved ends.
3. Insulating Unions: 250 PSI working pressure. Pipe ends and material to match piping. Electric current below 1 percent of galvanic current. Gasket material as recommended by manufacturer. Epco or approved.

B. Flanges for Pipe Size Over 1 Inch:
1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.12 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
3. Trapeze Hangers: Welded steel channel frames attached to structure.
4. Vertical Pipe Support: Steel riser clamp.

B. Plumbing Piping - Drain, Waste, and Vent:
1. Conform to MSS SP-58.
2. Steel hanger rods and clevis shall be cadmium or zinc plated.
3. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
4. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
7. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
8. Vertical Support: Steel riser clamp.
9. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
10. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:
1. Conform to MSS SP-58.
2. Steel hanger rods and clevis shall be cadmium or zinc plated.
3. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
4. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
6. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
7. Vertical Support: Steel riser clamp.

8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.13 GATE VALVES

A. Manufacturers:
   1. Nibco, Inc: www.nibco.com.
   2. Crane Co. Valve Division
   3. Milwaukee Valve Company: www.milwaukeevalve.com.

B. Up To and Including 2 Inches:
   1. Class 125, bronze, screw in bonnet, solid wedge. Rising Stem: Nibco 111. Nonrising Stem: Nibco 113.

C. 2-1/2 Inches and Larger:
   1. Class 125, iron body, bolted bonnet, flanged ends, renewable seat and disc, bronze mounted. Straight Body: Nibco F 718 B. Angle Body: Nibco F 818 B.

2.14 VALVES - GENERAL

A. General:
   1. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
   2. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves 6 inches and smaller, and 4 inches and smaller for plug valves. Provide gear operators for quarter-turn valves 8 inches and larger. Provide chain-operated sheaves and chains for overhead valves.
   3. End Connections: Mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option.

B. Service:
   1. Domestic Hot and Cold Water Shutoff and Isolation Valves:
      a. Pipe Sizes 2-1/2 Inches and Smaller: Ball valve.
      b. Pipe Sizes 3 Inches and Larger: Gate valve or butterfly valve.
   2. Drain Service; All Pipe Sizes: Drain valves.
   3. Bypass Around Pressure-Reducing Valves: Globe valves.
   4. Check Valves: Swing check.
   5. Relief Valve: ASME code approved pressure and temperature relief valve. Run full size pipe to floor drain, or as noted otherwise. Cash-Acme, Watts, or approved.
   6. Pressure Regulating Valves: Natural Gas/L.P.G.: Diaphragm and spring actuated type, with ventless or vented relief feature. Construction, pressure range and venting features suitable for intended service. Regulator to meet code and serving utility requirements. Pipe vented type to atmosphere in approved location. Maxitrol, Equimeter, or approved.

C. Manufacturers: Crane, Fairbanks, Anvil, Jenkins, Kennedy, Walworth, Red/White (commercial grade), Mueller, Legend, Conbraco, Nibco, DeZurik, Hays, Powell, Stockham, Hammond, Watts, Milwaukee, or approved. Note: See individual sections for specialty valves (balancing valves, pressure regulators, relief valves, earthquake valves, gas valves).

2.15 BALL VALVES

A. Manufacturers:
   1. Nibco, Inc: www.nibco.com.
   2. Crane Co., Valve Division
   3. DeZurik Co.
   4. Milwaukee Valve Company: www.milwaukeevalve.com.
   5. Stockham Valves and Fittings, Inc.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, three piece body, stainless steel ball, full port, teflon seats and stuffing box ring, stainless steel blow-out proof stem, lever handle with balancing stops, threaded ends with union. Nibco T-595-Y. Soldered: Nibco S-595-Y

2.16 NATURAL GAS VALVES

A. 2 Inches and Smaller: Ball valves. UL listed, two-piece construction, threaded, bronze body, conventional port, 250 PSI WOG working pressure. Watts B-6000UL.

B. 2-1/2 Inches and Larger: 100 to 125 PSI rated bronze or iron body/bronze trimmed plug cock type, square head or tee/lever handle operation. CSA approved.

2.17 GAS PRESSURE REGULATING VALVES

A. Manufacturers:
1. American Meter.
2. Invensys (Equimeter).
3. Maxitrol

B. Provide single stage, steel jacketed, corrosion resistant gas pressure regulating valves with atmospheric vent and elevation compensator sized for inlet and outlet pressures , specific gravity and volume indicated on the drawings. Construction, pressure range and venting features suitable for intended service. Regulator to meet code and serving utility requirements. Pipe vented type to atmosphere in approved location.

C. For sizes 2" and smaller: threaded ends.

D. For sizes 2-1/2" and larger: flanged ends.

E. Provide low pressure cutout and internal relief for each regulator.

2.18 SEISMIC GAS SHUTOFF VALVES

A. Manufacturers: Safetquake, Quakemaster or equal.

B. Valve is fabricated of aluminum, incorporates a stainless steel ball and bubble level, is vertically mounted, has a single step manual reset lever, operates at ambient temperature range of -40 deg F to +150 Deg F, minimum pressure .5 psi and maximum allowable pressure of 60 psi.

C. Valves actuates within 5 seconds when subjected to a horizontal sinusoidal oscillation having a peak acceleration of anyone of the following: (1) 0.70g and period of 0.13 second, (2) 0.40g and period of 0.20 second, (3) 0.30g and period of 0.40 second, (4) 0.25g and period of 1.00 second.

D. Valves shall not actuate when subjected for 5 seconds to a horizontal sinusoidal oscillation having a peak acceleration of anyone of the following: (1) 0.40g and period of 0.130second, (2) 0.20g and period of 0.20 second, (3) 0.15g and period of 0.40 second, (4) 0.10g and period of 1.00 second.

E. Meets or exceeds California standard, ANSI (Z21 1995), California Office of State Architect (Label Numbers CA-OSA 19.49 and CA-OSA 27.02, IAPMO, UPC (file 3D94), AGA P-70-2A, U.L. Building and Safety RR 4996.

2.19 BUTTERFLY VALVES

A. Manufacturers:
1. Grinnell Products, a Tyco Business; B302: www.grinnell.com.
2. Hammond Valve: www.hammondvalve.com.
3. Crane Co.: www.cranevalve.com.
4. Milwaukee Valve Company: www.milwaukeevalve.com.
5. Stockham Valves and Fittings, Inc.

B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.

C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.20 SWING CHECK VALVES

A. Manufacturers:

1. Nibco, Inc: www.nibco.com.
2. Milwaukee Valve Company: www.milwaukeevalve.com.

B. Up to 2 Inches:
1. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends. Nibco 413.

C. Over 2 Inches:
1. MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged ends. Nibco F918.

2.21 RELIEF VALVES

A. Temperature and Pressure Relief:
1. Manufacturers:
a. Watts Regulator Company: www.wattsregulator.com.
b. Cash-Acme
2. AGA Z21.22 certified, bronze body, manual lever operator, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled. Sized to meet BTUH requirements.

2.22 STRAINERS

A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.
2. Charles M. Bailey.
3. Metraflex.

B. Size 2-1/2 inch (64 mm) to 4 inch (100mm):
1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

2.23 WATER VALVE BOXES

A. Rectangular concrete valve box with cast iron hinged locking access cover, (traffic rated), labeled "water." Provide size adequate for depth, maintenance accessibility for valve assembly, and the like. Provide extensions as required. Manufacturers: Brooks Products Model 36-HFL, or approved.

2.24 PREMANUFACTURED COUNTERFLASHINGS

A. Factory-fabricated counterflashing constructed from Schedule 40 galvanized steel or galvanized malleable iron pipe coupling with tapered threads and 3 lb. lead sheet lead formed and soldered to coupling to produce counterflashing minimum of 4-inch overlap over roof flashings. Provide for pipe sizes as required. Manufacturers: A&B Sheetmetal, 503-254-5581.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

B. Conform with applicable codes and industry standards.

C. Install uninsulated piping so that unrestrained direct contact with the structure or other system installations is avoided. Where contact with or passage through building or structural features cannot be avoided; firmly anchor piping to, or isolated from, the structure to prevent noise

transmission and occurrence of physical damage. Install piping to be insulated with adequate clearance around piping to allow for placement of full thickness insulating material.

D. Corrosion Control:
   1. Underground Steel Piping Corrosion Protection: Factory wrap uninsulated underground steel piping systems with protective coating composed of a coal-tar saturated wrapping tape over a 20 mil thick coal-tar epoxy coating, equivalent to "Republic X-Tru-Coat." Wrap joints spirally with a minimum overlap of 1/2 tape width. Extend wrap not less than 3 inches above grade. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.
   2. Install hot water heating vessels with a stainless steel fitting at tank and a dielectric fitting on both supply and discharge sides of hot water tanks.

E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

F. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

G. Install piping to maintain headroom, conserve space, and not interfere with use of space.

H. Group piping whenever practical at common elevations.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

J. Installation/Coordination:
   1. Expansion and Flexibility: Install work with due regard for expansion, contraction, and building settlement to prevent damage to the piping, ductwork, equipment and the building and its contents. Provide piping offsets, loops, expansion joints, anchors or other means to control pipe movement, to minimize pipe forces and effects of building settlement.
   2. Install piping to prevent stresses and strains to piping and hangers and supports due to expansion or contraction and building settlement. Provide proper loops, guides, offsets, anchor points, or expansion joints. Verify with anticipated settlement or shrinkage of building. Verify construction phasing of project, type of building construction products and type for coordinating installation of piping systems. Include provisions for servicing and removal of equipment without dismantling piping.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

L. Provide access where valves and fittings are not exposed.

M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.

N. Excavate in accordance with the paragraphs in this Section and Divisions 31 and 32 for work of this Section.

O. Backfill in accordance with the paragraphs in this Section and Divisions 31 and 32 for work of this Section.

P. Install underground valves in valve box, Christy or equal, sized to allow access for maintenance.

Q. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

R. Sleeve pipes passing through partitions, walls and floors.

S. Pipe Sleeves:
   1. Lay out work in advance of pouring concrete and furnish and set sleeves necessary to complete work.
   2. Floor Sleeves (Except DWV Piping at Slab on Grade): Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1 inch above finished floor. Caulk pipes passing through floor with nonshrinking grout or approved caulking compound. Provide "Link-Seal" sleeve sealing system for slab on grade. Caulk/seal

piping and ductwork passing through fire rated building assembly with UL rated assemblies. Provide fire-rated assemblies per local AHJ requirements.

3. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with nonshrinking caulking compound. Caulk/seal piping and ducts passing through fire-rated building assemblies with UL approved fire-rated assemblies. Provide fire-rated assemblies per local AHJ requirements.
4. Beam Sleeves: Coordinate with trades for locations of pipe sleeves in reinforced concrete and steel beams. Penetrations must be indicated on structural shop drawings. See Drawings and Specifications for specific sleeve location limitations. Plumbing Drawings are diagrammatic. Offset piping as required to meet these limitations. Pipe sleeve locations must be indicated on reinforced concrete and steel beam shop drawings. Field cutting of beams not allowed without written approval of structural engineer. No extra costs allowed for failure to coordinate beam penetrations prior to reinforced concrete and steel beam shop drawing submittal.

T. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Provide copper plated hangers and supports for copper piping.
7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.4 PIPING SYSTEMS INSTALLATION

A. Piping:
1. General: Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous materials as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops. Coordinate installation of piping below with structural components and other system installations.
2. Establish elevations of buried piping outside the building to ensure not less than 2 ft of cover.
3. Install piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent). Where this slope is impractical, slope at 1/4 inch per foot for pipes below 4-inch size, and 1/8 inch per foot (1 percent) for piping 4 inches and larger, with the approval of the local code authority.
4. Install water piping to ASME B31.9.
5. Condensate Drain Piping at HVAC Units: Trap condensate drain for HVAC units. Install condensate drain piping with p-trap and slope to drain at minimum of 1/8 inch per foot slope.
6. Seismic Restraint: Brace plumbing piping and plumbing equipment against lateral movement as detailed in document "Seismic Restraint Manual Guidelines for Plumbing Systems" as published by SMACNA.
7. Rough-in Piping: Provide temporary caps or plugs at piping shown on Drawings to be roughed-in for future connections by others.

8. Sanitary Waste and Storm Drain Piping: Slope at uniform grade of 1/4 inch per foot unless noted otherwise. Make changes in size with reducing and wye fittings. Run exposed piping parallel or perpendicular to building structure.
9. Sanitary Waste Piping from Back-to-Back Water Closets: Provide individual rough-in piping for each back-to-back water closet, no common sanitary cross, double fixture or double combination wye and 1/8 bend fittings allowed.
10. Vent Piping:
    a. General: Horizontal runs free of drops and sloped to drainage system.
    b. Do not locate waste vents in equipment wells; locate waste vents down wind from outside air intakes of HVAC equipment.
    c. Vents-Through-Roof (VTRs): Provide flashing with counterflashing at vent penetrations through roof, as detailed. Install vent piping penetrating roofed areas to maintain integrity of roof assembly. Wherever vents run up near or inside of exterior walls, offset pipe at underside of roof deck to obtain minimum 5-foot clearance between parapet and roof penetration. Provide code required clearances between vent-through-roof and HVAC equipment on roof. VTR counterflashings to have a manufactured rolled return bend with minimum 1-inch overlap; crimping by hand tools will not be allowed. On single ply vinyl or plastic type roofs, provide flashings as required by roof installer and manufacturer. On raised rib steel roofs, provide flashings as required by roof installer and manufacturer.

B. Cleanouts: Install in aboveground piping and building drain piping as indicated, as required by code; at each change in direction of piping greater than 135 degrees; at minimum intervals of 100 feet; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping. Select type to match adjacent building finish. Coordinate locations and types of cleanouts with Architect prior to installation.

C. Equipment Connections:
1. Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by code.
2. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.
3. Piping Runouts to Fixtures: Provide hot and cold piping runouts to fixtures of sizes indicated, but in no case smaller than required by code.
4. Equipment Connections: Connect hot and cold water piping system to equipment as indicated, and comply with equipment manufacturer's instructions. Provide shutoff valve and union for each connection; provide drain valve on drain connection.

D. Domestic Water Distribution Piping:
1. Water Service Piping: Provide sleeve in foundation wall for water service entry; make entry watertight. Provide shutoff valve at water service entry inside building; pressure gauge, test tee with valve.
2. Water Hammer Arrestors: Install in upright position, in locations and of sizes in accordance with PDI WH-201, and elsewhere as indicated.
3. Group piping installations and valves where possible to obtain maximum practical use of available space.
4. Arrange locations of valves, unions, drains and other components to provide for ease of cleaning, operation, repair or service. Size access panels and locate to provide both acceptable proximity and working space for such devices.
5. Provide valves and shock arrestors where required by code and where otherwise indicated in Specifications and on Drawings.
6. Provide protection plates for piping installed in wood stud walls and other building substructures as required by code.
7. Wherever piping is installed in exterior walls, route on warm side of insulation and as close to inside wall finish as possible, as detailed.
8. Provide low point drains and shutoff valves as required by local AHJ. Provide valve boxes, access panels, and the like, for complete installation.

E. Valves:
   1. Install valves with stems upright or horizontal, not inverted.
   2. Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.
   3. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
   4. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain domestic water piping system.
   5. Check Valves: Install on discharge side of each pump, and elsewhere as indicated.
   6. Balancing Valves: Install in each hot water recirculating loop, and elsewhere as indicated.

F. Pressure Regulating Valves: Provide inlet and outlet ball valves, and globe valve bypass. Provide pressure gauge on valve outlet.

G. Gas Piping:
   1. General: Provide shutoff valves, pressure regulators and unions at connections to gas-fired equipment. Provide dirt legs at low points.
   2. Install gas piping in accordance with NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2015. Purge, clean and charge piping in accordance with NFPA 54.
   3. Adjust gas pressure regulating valves at full load condition to deliver required gas pressure to equipment.
   4. Provide support for utility meters in accordance with requirements of utility companies.
   5. Piping Through Roof: Coordinate exact location with roof structure and roof mounted equipment. Provide 2-1/2 lb. lead flashing with manufactured counterflashing at roof penetration.
   6. Paint piping exposed to weather with one coat of Rustoleum.
   7. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.

H. Gas Regulator Vent Piping: Paint piping exposed to weather with one coat of Rustoleum.

3.5 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

A. Provide proper sizing when providing sleeves or core-drilled holes to accommodate the penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet the requirements of ASTM E814.

B. Manufacturers: Hilti, Proset, or approved.

3.6 EXCAVATION AND BACKFILL:

A. General: Perform necessary excavation and backfill required for installation of plumbing work. Repair piping or other work damaged by Contractor's operations.

B. Water: Keep excavations free of standing water. Reexcavate and fill back excavations damaged or softened by water or frost to original level with sand, crushed rock or other approved material at no expense to Owner.

C. Tests: During progress of work for compacted fill, Owner reserves right to request compaction tests made under direction of a testing laboratory.

D. Trench Excavation: Excavate trenches to necessary depth and width, removing rocks, unstable soil (muck, peat, and the like), roots and stumps. Excavation material is classified as "base fill" and "native." Base fill excavation material consisting of placed crushed rock may be used as backfill above "Pipe Zone." Remove and dispose off site native excavation material at no expense to Owner. Adequate width of trench for proper installation of piping or conduit.

E. Support Foundations:

1. Foundations: Excavate trenches located in unstable ground areas below elevation required for installation of piping to a depth which is determined by Architect as appropriate for conditions encountered. Place and compact approved foundation material in excavation up to "Bedding Zone." Dewatering, placement, compaction and disposal of excavated materials to conform to requirements contained in other sections of Specifications or drawings.
2. Over-Excavations: Where trench excavation exceeds required depths, provide, place and compact suitable bedding material to proper grade or elevation at no additional cost to Owner.
3. Foundation Material: Where native material has been removed, place and compact necessary foundation material to form a base for replacement of required thickness of bedding material.
    a. Material Passing 3/4-Inch Square Opening:
        1) Class A: Min 27; Max 47.
        2) Class B: Min 0; Max 1.

F. Bedding Material: Full bed site piping on sand, pea gravel or 3/4-inch minus crushed rock. Place a minimum 4-inch deep layer of sand or crushed rock on leveled trench bottom for this purpose. Remove bedding to necessary depth for piping bells and couplings to maintain contact of pipe on bedding for its entire length. Provide additional bedding in excessively wet, unstable, or solid rock trench bottom conditions as required to provide a firm foundation.

G. Backfilling:
1. Following installation and successful completion of required tests, backfill piping in lifts.
    a. In "Pipe Zone," place backfill material and compact in lifts not to exceed 6 inches in depth to a height of 12 inches above top of pipe. Place backfill material to obtain contact with entire periphery of pipe, without disturbing or displacing pipe.
    b. Place and compact backfill above "Pipe Zone" in layers not to exceed 12 inches in depth.
2. Backfill Material:
    a. Backfill Material in "Pipe Zone": 3/4-inch minus crushed rock, sand or pea gravel.
    b. Crushed rock, fill sand or other backfill material approved elsewhere in Specifications may be used above "Pipe Zone."

H. Compaction of Trench Backfill:
1. Where compaction of trench backfill material is required, use one of following methods or combination thereof:
    a. Mechanical tamper,
    b. Vibratory compacter, or
    c. Other approved methods appropriate to conditions encountered.
2. Architect to have right to change methods and limits to better accommodate field conditions. Compaction sufficient to attain 95 percent of maximum density at optimum moisture content unless noted otherwise on Drawings or elsewhere in Specifications. Water "puddling" or "washing" is prohibited.

3.7 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

D. Install globe valves for throttling, bypass, or manual flow control services.

E. Provide ball valves in natural gas systems for shut-off service.

3.8 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.9 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.10 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 11 inch wg.

3.11 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inches to 3 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.
      d. Pipe Size: 4 inches to 6 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 5/8 inch.

END OF SECTION

SECTION 22 10 06 - PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Drains.

B. Roof and floor drains.

C. Cleanouts.

D. Hose bibbs.

E. Hydrants.

F. Water hammer arrestors.

G. Trap primers.

1.2 RELATED REQUIREMENTS

A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

B. Section 22 10 05 - Plumbing Piping.

C. Section 22 40 00 - Plumbing Fixtures.

1.3 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains; 2001 (R2007).

B. ASME A112.21.2M - Roof Drains; The American Society of Mechanical Engineers 2001.

C. ASSE 1011 - Hose Connection Vacuum Breakers; 2004.

D. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

E. NSF 372 - Drinking Water System Components - Lead Content; 2011.

F. PDI-WH 201 - Water Hammer Arresters; 2010.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.

E. Project Record Documents: Record actual locations of equipment, cleanouts, water hammer arrestors.

F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.2 DRAINS

A. Manufacturers:
   1. Josam Company: www.josam.com.

2. Jay R. Smith Manufacturing Company.
3. Zurn Industries, LLC: www.zurn.com.
4. Watts.
5. Mifab.
6. Approved equal.

B. Roof Drains:
1. Manufacturer: Zurn Model Z-125-92 combination roof drain and overflow drain or Zurn Model Z-125 for roof drain and for overflow drain.
2. Assembly: ASME A112.21.2M.
3. Body: Lacquered cast iron with sump.
4. Strainer: Removable polyethylene dome with vandal proof screws.
5. Overflow: Lacquered cast iron body and clamp collar and bottom clamp ring; pipe extended to 2 inches above flood elevation.
6. Accessories: Coordinate with roofing type:
   a. Membrane flange and membrane clamp with integral gravel stop.
   b. Adjustable under deck clamp.
   c. Roof sump receiver.
   d. Waterproofing flange.
   e. Controlled flow weir.
   f. Leveling frame.
   g. Adjustable extension sleeve for roof insulation.

C. Downspout Nozzles:
1. Bronze round with straight bottom section. Zurn Z-199, J.R. Smith, Mifab, or approved equal.

D. Floor Drain (FD):
1. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer. Zurn, J.R. Smith, Wade, Watts, Mifab, or approved equal.

2.3 CLEANOUTS

A. General: Locate cleanouts as shown on Drawings and as required by local code. Cleanouts same size as pipe except that greater than 4 inches will not be required. Plastic components not allowed, except unless specifically noted.

B. Types:
1. Tile Floor Cleanouts: J. R. Smith 4020-U with round heavy-duty nickel bronze top, taper thread, ABS plug and vandalproof screws.
2. Carpeted Floor Cleanout: J. R. Smith 4020-U-X with carpet clamping frame with round heavy-duty nickel bronze top, taper thread, ABS plug, carpet clamping device and vandalproof screws.
3. Concrete Floor Cleanout (General): J. R. Smith 4020 with round heavy-duty nickel bronze top, taper thread and ABS plug with vandalproof screws.
4. Concrete Floor Cleanout (Heavy Load): Same as for "General" locations, Item 3 above, except J. R. Smith 4100.
5. Wall Cleanout: J. R. Smith 4472-U, countersunk bronze taper thread plug, stainless steel shallow cover and vandalproof screws.
6. Cleanouts in concealed aboveground cast iron soil or waste lines: Zurn Z-1440A with raised head ABS plastic plug.
7. Outside Area Walks and Drives: J. R. Smith 4023-U with round heavy-duty nickel bronze top, taper thread, ABS plug and top secured with vandalproof screws. Install in 18- by 18- by 6-inch deep concrete pad flush with grade.

C. Manufacturers: J. R. Smith, Zurn, Wade, Watts, or approved. J. R. Smith model numbers used as a basis of selection.

2.4 HOSE BIBBS

A. Manufacturers:
1. Interior: Acorn Model 8121CR-LF; Exterior (roof): Acorn Model 8126-LF.
2. Jay R. Smith Manufacturing Company.
3. Watts Regulator Company: www.wattsregulator.com.
4. Zurn Industries, LLC: www.zurn.com.
5. Woodford.
6. Mifab.

B. Interior Hose Bibbs:
1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, rough chrome plated where exposed with lockshield and removable key, integral vacuum breaker in conformance with ASSE 1011.

C. Exterior Hose Bibbs:
1. Bronze or brass, replaceable hexagonal disc, hose thread spout with wall plate, bronze nickel plated finish with lockshield and removable key, integral vacuum breaker in conformance with ASSE 1011.

2.5 HYDRANTS

A. Manufacturers:
1. Acorn Model 8151 (cold water only).
2. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
3. Zurn Industries, LLC: www.zurn.com.
4. Woodford.
5. Chicago.
6. Mifab.
7. Approved equal.

B. Wall Hydrants:
1. ASSE 1019; valve shall be cartidge operated type with stainless steel lockable recessed box with wall flange, hose thread spout, lockshield and removable key, and integral vacuum breaker.

2.6 WATER HAMMER ARRESTORS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
2. Zurn Industries, LLC: www.zurn.com.
3. Amtrol.
4. Wade.
5. Approved equal.

B. Water Hammer Arrestors:
1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F, maximum 125 psi working pressure and maximum 250 psi static pressure.

2.7 TRAP PRIMERS

A. Provide trap primers, 1/2 inch size, where indicated on drawings. Provide with built-in air gap and install 1/2" shutoff valve. PVC housings are not acceptable. Code approval required. Install trap primer line with 1/4" per foot slope to insure full drainage to floor drain or floor sink. Install tap primer behind wall with J.R. Smith 4740 access door. Manufacturer: Zurn, J.R. Smith, Wade, PPP, or approved equal.

B. Provide a distribution unit with feeder piping for a maximum of four (4) traps where multiple traps are serviced by a single trap primer.

2.8 THERMOMETERS

A. 3-inch diameter bi-metal dial thermometer with stainless steel case, white dial, black numbers with 4-inch stainless steel stem and brass separable socket. Provide back or bottom connections as required. 0F to 200F range. Manufacturers: Weiss Model 3BMS, Palmer, Ashcroft, Trerice, Marshaltown, Weksler, or approved.

2.9 PRESSURE GAUGES

A. Single-pointer gauge with 0 to 100 PSI range, 10 PSI intervals and 1 PSI increments intermediate graduations. Aluminum dial with 1 percent accuracy and low bottom connections for wall mounting. Manufacturers: Weiss, Palmer, Marshaltown, Trerice, Ashcroft, Weksler, U.S. Gauge, or approved.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install cleanouts in all horizontal soil and waste piping at 50 feet maximum spacing inside building, 100 feet maximum spacing outside building, at every change of direction and where shown on Drawings.

E. Install cleanouts in waste drops from each lavatory and sink.

F. Install cleanouts in rain water (storm drain) drops 18 inches above finished floor. For concealed rainwater drops extend cleanout to building exterior for access.

G. Install floor cleanouts at elevation to accommodate finished floor.

H. FLOOR DRAINS AND FLOOR SINKS
   1. General: Install drains in accordance with manufacturer's written instructions and in locations indicated.
   2. Coordinate with piping as necessary to interface drains with drainage piping systems.
   3. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of floor drains flush with finished floor. Set floor sinks as required by local codes.
   4. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
   5. Position drains so that they are accessible and easy to maintain.
   6. Coordinate drain flashing, flanges and strainer types and depths with floor substrate and topping configuration.
   7. Primers: Prime drains. Refer to Drawings and coordinate location with Architect. Coordinate with local AHJ for exact requirements.

I. ROOF DRAINS/OVERFLOW DRAINS
   1. General: Install drains in accordance with manufacturer's written instructions and in locations indicated.
   2. Coordinate metal flashing work with work of roofing, waterproofing, and adjoining substrate work.
   3. Coordinate with roofing as necessary to interface roof drains with roofing work.
   4. Coordinate with storm water piping as necessary to interface drains with drainage piping systems.
   5. Install drains at low points of surface areas to be drained.
   6. Install drains flashing collar or flange so that no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
   7. Position drains so that they are accessible and easy to maintain.
   8. Set overflow drains at proper elevation relative to main roof drains.

J. HOSE BIBBS (INSIDE)
   1. Install on exposed piping where indicated, with vacuum breaker.

K. HOSE BIBBS AND HYDRANTS
   1. Install where indicated, with vacuum breaker and in accordance with manufacturer's installation instructions.

L. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to drinking fountains, lavatories, sinks, urinals, and water closets.

M. Water Hammer Arrestors (Shock Absorbers): Locate shock absorbers in supply pipe in accordance with recommendations of Plumbing and Drainage Institute PDI WH201. Install ahead of solenoid operated valves. Determine size of absorber by fixture unit value of fixture supplied, using PDI symbols to designate sizes. Provide access panel for each shock absorber.

END OF SECTION 22 10 06

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fixtures:
1. Plumbing fixtures and trim, including rims for sinks and lavatories in casework or counters, chair carriers (as required), drinking fountains, drains, cleanouts, floor sinks, and related fixtures shown on the Drawings.
2. Rough and final connection to equipment and fixtures, relocated or provided under other sections by Owner and under other divisions of the work.
3. Standards and supports for equipment requiring them.
4. Instructions and maintenance manuals for equipment furnished by this Section.

1.2 RELATED REQUIREMENTS

A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

B. Section 07 90 05 - Joint Sealers: Seal fixtures to walls and floors.

C. Section 22 10 05 - Plumbing Piping.

D. Section 22 10 06 - Plumbing Piping Specialties.

1.3 REFERENCE STANDARDS

A. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 2002.

B. ASME A112.18.1 - Plumbing Supply Fittings; 2018.

C. NSF 61 - Drinking Water System Components - Health Effects; 2018.

D. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.4 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer's Instructions: Indicate installation methods and procedures.

D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Manufacturers: Firms regularly engaged in manufacture of plumbing system products, of types, materials, and sizes required.

C. Regulatory Requirements:
1. Codes: Comply with CPC pertaining to plumbing materials, construction and installation of products. Comply with local and state regulations.
2. ANSI Compliance: Comply with applicable American National Institute standards pertaining to products and installation.
3. PDI Compliance: Comply with applicable Plumbing and Drainage Institute standards pertaining to products and installation.
4. Federal Standards: Comply with applicable Federal Specification WW-P-541 Series sections pertaining to plumbing fixtures.
5. NAHB Label: Provide fiberglass bathtub units and shower stalls which have been tested and labeled by NAHB Research Foundation.

6. ADA Compliance: Construct and install barrier-free plumbing fixtures in accordance with "The Americans with Disabilities" Act.
7. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by UL and which comply with NEMA standards.
8. CEC Compliance: Comply with CEC as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.8 WARRANTY

A. See Section 01 78 00 – Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 GENERAL

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 GENERAL REQUIREMENTS:

A. Refer to Architectural drawings for exact locations, fixture mounting heights and ADA accessibility requirements.

B. Insulate domestic hot water, tempered water and waste piping below handicapped plumbing fixtures with molded single piece removable insulation covers, foam, fire resistant, Truebro, or equal. Install insulation covers in accordance with ADA requirements.

C. Provide 85% IPS red brass pipe for each connection to faucets, stops, hose bibs, and other fixtures/trim. Securely anchor brass pipe to structure. Install stop valves on water supply lines for each fixture, except hose bibbs.

D. Provide compression shutoff control stop valves with IPS inlets and threaded brass nipples at pipe connection on water supplies to each fixture. Provide stops with lock shield loose key and key handle for each stop. For combination fixtures, provide with compression stop and IPS inlet on each water supply fitting.

E. Provide cast brass escutcheons, except escutcheons exposed to view shall have chrome plated finish.

F. Provide chromium-plated finish on fittings and accessories exposed to view.

G. Fixture fittings and trim: Conform to ASME A112.18.1M and ASME A112.19.5, as applicable.

H. Centerset faucets: Top-mounted with inlets on not greater than 4-inch centers, unless specified otherwise below.

I. Separate faucets and combination supply fittings: Provide inlets on 8-inch centers.

J. Zinc-alloy or plastic handles are not permitted for faucets and valves.

K. Provide special roughing-in for wheelchair fixtures.

L. Provide water hammer arrestors at end of pipe runs to two or more fixtures, properly sized with sufficient displacement volume to dissipate calculated energy in the piping systems. Water hammer arrestors shall be stainless steel shell with stainless steel bellows contained within the casing, Zurn Model Z-1700, or equal. See Section 22 10 06. Locate in accessible location or provide access panel with location approved by Architect.

M. Fixture dimensions specified are nominal.

2.3 PLUMBING FIXTURES

A. General: Provide factory fabricated fixtures of type, style and material indicated on the plumbing fixture connection schedule on the Drawings. 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 manufacturer, and as required for complete installation. Where more than one type is indicated, selection is installer's option; but, fixtures of same type must be furnished by a single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.
   1. Fixtures: Complete with fittings, supports, fastening devices, faucets, valves, traps, stops and appurtenances required.
   2. Exposed IPS Piping and Tubing: Brass, chrome plated.
   3. Escutcheons: Brass, chrome plated.
   4. Fixture Locations: As shown on Drawings.
   5. Stops: Stops installed in each supply pipe at each fixture accessibly located with wall escutcheons.
   6. Public Lavatories: Provide with flow control device to prevent flow over 0.5 GPM.
   7. Interior Faucets Except Public Lavatories: Provide with flow control device to prevent flow over 0.5 GPM.

2.4 FIXTURE TRIM

A. Traps: Provide traps on fixtures except fixtures with integral traps. Exposed traps chromium plated cast brass or 17-gauge chromium plated brass tubing. American Standard, Kohler, Chicago, BrassCraft, Eastman, Speedway, McGuire, or approved.

B. Supplies and Stops: First quality, chrome plated with brass stems. Stops: Loose key type. American Standard, Kohler, Chicago, BrassCraft, Eastman, Legend, Speedway, McGuire, or approved.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PROTECTION

A. Protect fixtures and equipment from damage. Replace damaged items with new.

B. Keep pipe openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, ductwork, fixtures, equipment and apparatus against dirty water, chemical or plumbing damage both before and after installation. Restore to its original condition or replace fixtures, equipment or apparatus damaged prior to final acceptance of the work.

C. Protect bright finished shafts, bearing housings and similar items, until in service; no rust will be permitted.

D. Cover equipment and materials stored on the job site or otherwise suitably protect at the direction of, and to the satisfaction of Architect. If coverings become torn, replace until the equipment is connected and operating.

3.3 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.4 INSTALLATION - GENERAL

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 05, color to match fixture.

F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.5 FIXTURES INSTALLATION

A. General:
1. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes.
2. Verification of Conditions: Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures.
3. Set and connect to soil, waste, vent and water piping in neat, finished and uniform manner. Connections to be equal height, plumb and set at right angles to floor, or both unless otherwise required or specified.
4. Seal fixtures mounted on floors and walls at abutting joints with approved sealant compounds as directed by Architect.
5. For ADA accessible toilets, provide with handle at wide portion of stall.
6. Lavatories: Set mixing valves to limit outlet temperature to 110F.

B. Fixture Locations: As shown on Drawings. Center water closets and urinals between privacy partitions unless noted otherwise.

C. Stops: Stops installed in each supply pipe at each fixture accessibly located with stops of loose key type. Concealed stops to be screwdriver or loose key type with wall escutcheons.

D. Fixture Supports:
1. Support wall hung water closets, urinals and lavatories on heavy duty, full size, concealed, commercial grade chair carriers mounted to floor structure. Refer to plumbing fixture connection schedule on drawings.
2. Support other fixtures mounted on stud partitions on heavy concealed wall brackets bolted to a 1/4-inch thick by 5-inch high steel plate anchored firmly to studs with bolts (or welded to metal studs). Plate to extend one stud each way beyond fixture mounting point width.

E. Flush Valves: Provide "drop-ear" ells or couplings in wall at water supply outlets to flush valves; anchor firmly to structure. At ADA accessible fixtures, face handle to wide portion of stall.

F. After fixtures are set in place and secured to walls, caulk around between fixtures and wall with white silicone caulking compound. Dow Corning 780, General Electric Construction Sealant, or approved.

G. Set countertop lavatories and stainless-steel sink rims in waterproof sealant made for application.

H. Adjust self-closing faucets to provide minimum of 10 seconds of waterflow, and maximum of 15 seconds.

I. After fixture installation is complete, cover and protect rims, fronts and exposed parts until completion of construction phase. Contractor to be responsible for damage to fixtures and assumes related fixture repair or replacement costs.

J. Adjusting and Cleaning: Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation. Adjust water pressure at drinking fountains, faucets, shower valves and flush valves to provide proper flow stream and specified GPM. Repair leaks at faucets and stops.

K. Extra Stock: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner.

L. Field Quality Control:
   1. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
   2. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

M. Adjusting and Cleaning: Piping: Clean piping exterior surfaces. Comply with Section 22 07 19, Insulation, as applicable. Flush out water filled or drainage piping systems with clean water.

N. Hose Bibb Piping: Provide each hose bibb with an individual accessible shutoff valve (ball type). Locate where shown on Drawings. Provide full access.

3.6 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

END OF SECTION

SECTION 26 00 00 - ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Furnish and install all necessary labor, materials, tools and equipment to perform and completely finish the work according to the intent of this specification, and the accompanying drawings.

B. Furnish and install any incidental work which can reasonably be inferred as required and necessary to provide complete and workable systems.

C. Provide connections of all equipment specified under these sections and other Divisions including Divisions 22 (Plumbing) and 23 (HVAC) including installation and connection of all motors, relays, remote starters, etc.

D. The requirements of the General and Supplemental Conditions, and Division 01 apply to Divisions 26, 27 and 28, and these specifications. All sections in Divisions 26, 27, and 28 are interrelated. Work specified in other sections, as applicable, shall apply to all work hereunder.

1.2 LOCAL CONDITIONS

A. Examine site; verify dimensions and locations against drawings and become informed of all conditions under which work is to be done before submitting proposal. No allowance will be made for extra expenses because of omission on Contractor's part to include cost of work under prevailing conditions.

B. Information shown relative to services is based upon available records and data shall be regarded as approximate only. Minor deviations found necessary to conform with actual locations and conditions shall be made without extra cost.

C. Extreme care shall be exercised in excavating near existing utilities to avoid any damage thereto. It shall be the contractor's responsibility to verify existing underground utilities prior to digging anywhere. Information provided on these plans indicating existing conditions shall only be used as reference, and shall not be deemed considered accurate. Any damage to existing utilities done by the contractor shall be repaired and/or replaced by the contractor at their expense to its pre-damage condition.

1.3 PERMITS AND INSPECTIONS

A. Obtain and pay for all permits and service charges required in installation of the work. Arrange for required inspections and secure approvals from authorities having jurisdiction.

B. During its progress, work shall be subject to inspection by Project Inspector.

1.4 CODES AND STANDARDS

A. Work and materials shall be in full accordance with California Occupational Safety Health Act (CAL-OSHA), California Electrical Code (CEC), State Fire Marshal, Electrical Safety Orders (Title 8, Subchapter 5), the National Fire Protection Association, California Building Code (CBC); California Code of Regulations - Title 24 and other applicable State or local laws or regulations. Nothing in the Drawings or Specifications shall be construed to permit work not

conforming to these codes.

B. Electrical materials shall bear the label of, or be listed by, the Underwriter's Laboratories (UL) unless of a type for which label or listing service is not provided.

C. Materials and components shall conform to Industry Standards, including:

NEMA	-	National Electrical Manufacturer's Association
ANSI	-	American National Standards Institute
ASTM	-	American Society For Testing Material Association
IPCEA	-	Insulated Power Cable Engineer's Association
CBM	-	Certified Ballast Manufacturers

D. When Contract Documents differ from governing codes, furnish and install larger size or higher standards called for without extra charge.

1.5 REVIEW OF MATERIALS

A. Prior to commencement of Work and within 35 days after award of contract, submit for approval in accordance with General Conditions all equipment and materials to be furnished.

1. Equipment/Product submittals shall be bound and indexed and shall include a table of contents listing all equipment submitted. The table of contents shall include: Project designation, submittal number, submittal name including specification section, date, and include manufacturer, model number, reference specification paragraph or sheet detail number, description, and page location. Where a group or series of products are submitted, each item does not have to be listed, only the series need to be identified. Example:

Project:
Submittal No.
Submittal Name:
Date:

Page(s)	Manufacturer	Model No.	Detail No.	Spec para., Description
1-12	**XYZ Corp**	**123ABC**	**2.05**	**Control panel**
13,14	**XYZ Corp**	**456DEF**	**2.06-A**	**Power supply**
15	**ABC Corp**	**789GHK**	**A/E9.5**	**Rack**
16,17	**Cantex**	**PVC-40**	**2.01**	**PVC conduit**
18	**Steel City**	**XYZ series**	**2.02**	**Steel fittings**

2. Shop drawings submittals shall be neat and professionally done using CAD (computer aided drafting), hand-drawn submittals will not be accepted. Shop drawings shall have sufficient information to clearly indicate work to be performed and be complete including device/equipment locations, wire sizes, wire types and number of wires, symbol list or legend, point-to-point connections, wiring diagrams, and equipment anchorage detail where needed. Shop drawings shall utilize the same size paper as the Bid set of plans.

3. Electronic submittals in PDF format are allowed and preferred.

B. Substitutions:

1. Only one request for substitution will be considered on each item of material or equipment. No substitutions will be considered thereafter. Substitutions will be interpreted to be all manufacturers other than those specifically listed by model or catalog number. Should the original submittal of a proposed substitution be rejected, the specified item shall be furnished.
2. Submit complete information or catalog data to show equality of equipment or material offered to that specified. Identify which product is being substituted in the specifications and/or the plans and provide analysis as indicating either it "Complies" or that it "Does Not Comply" and providing a reason. Each Specification paragraph shall be provided with this analysis. No substitutions will be allowed unless requested and approved in writing. Materials of equal merit and appearance, in the opinion of the Engineer, will be approved for use. Engineer reserves the right to require originally specified item.
3. Acceptance of a substitute is not to be considered a release from the Specifications. Any deficiencies in an item, even though approved, shall be corrected by the Contractor at his expense.
4. Responsibility for installation of approved substitution is included herein. Any changes required for installation of approved substituted equipment shall be made without additional cost to Owner.

C. Where it is in the best interest of the Owner, Engineer may give written consent to a submittal received after expiration of designated time limits, or for an additional resubmittal.

D. Submit for approval in ample time to avoid delay of construction, shop drawings or submittals on all items of equipment and materials covered in list mentioned above. Submit in accordance with General Conditions in a complete package; partial submittals will not be considered.

E. Failure to comply with any of the preceding requirements will necessitate that the specified materials be submitted and supplied.

1.6 RECORD DRAWINGS

A. Upon completion of Work, furnish Engineer with Autocad file, PDF file, and one printed full-size hardcopy upon which shall be shown all Work installed under contract including any work which are not in accordance with Original Contract Drawings. Autocad files shall be 2004 or later version, with external references bound to its parent drawing. Provide a separate PDF file for each sheet, do not combine all sheets into a single file. Furnish digital files on a USB flash drive or CD.

1. The above shall also include shop drawings.

B. All symbols and designations used in preparing Record Drawing shall match those used in Contract Drawings.

C. Show all buried and concealed conduit, stub-outs, etc. Locate all buried conduit and stub-outs by dimensions from permanent, easily located and identifiable portions of structure; also, dimension ends of stub-outs, etc. Note depth of buried items below grade.

1.7 ADDENDA AND CHANGE ORDERS

A. Changes in the plans and specifications shall be made by Addenda or Change Orders signed by the Architect and Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials mentioned herein or on drawings require that each item listed be provided and of quality noted, or an approved equal. All material shall be new, full weight and standard in all respects and in first-class conditions. Where possible, all materials used shall be of the same brand or manufacturer throughout for each class of material or equipment.

B. Grade or quality of materials desired is indicated by trade names or catalog numbers stated herein. Dimensions, sizes and capacities shown are a minimum and shall not be changed without permission of Engineer.

PART 3 EXECUTION

3.1 DRAWINGS AND COORDINATION

A. Examine Drawings and Site; be familiar with types of construction where electrical installation is involved. Work shall be neatly installed in a workmanlike manner in accordance with NECA Standard of Installation. Work shall be coordinated with other trades to avoid conflicts. Clarifications will be made by Engineer and minor adjustments shall be made without additional cost to Owner. Obtain ruling from Engineer concerning any obvious discrepancies or omissions in work before bidding. All work involved in correcting obvious errors or omissions after award of Contract shall be performed as directed by Engineer without additional cost to Owner.

B. Layouts of equipment, accessories and wiring systems are diagrammatic (not pictorial), but shall be followed as closely as possible. Drawings and Specifications are for assistance and guidance, and exact locations, distances, levels, etc., will be governed by Site.

C. All equipment (devices, conduits, boxes, etc.) shall be flush or semi-flush mounted unless otherwise noted. Where conditions do not allow flush mounting and where acceptable to the Architect, equipment may be surface mounted.

3.2 WORKING SPACE

A. Provide adequate working space around electrical equipment in compliance with Article 4 of Electrical Safety Orders. In general, provide 36 inches minimum clear work space in front of panelboards and controls of 120/208 volt systems and 42 inches minimum for 277/480 volt systems.

3.3 CARE AND CLEANING

A. All broken, damaged or otherwise defective parts shall be repaired or replaced without additional cost to Owner. Work shall be left in a condition satisfactory to Engineer. At completion, carefully clean and adjust all equipment, fixtures and trim installed as part of this work. Systems and equipment shall be left in a satisfactory operating condition.

B. All surplus materials and debris resulting from this work shall be cleaned out and removed from site; this includes surplus excavated material.

3.4 EXCAVATING AND BACKFILLING

A. Excavate and backfill as required for installation of electrical work. Restore all surfaces, roadways, sod, walks, curbs, walls, existing underground installation, etc., cut by installations

to original condition in an acceptable manner. Maintain all warning signs, barricades, flares and lanterns as required by the Safety Orders and local ordinances.

B. Excavation: Dig trenches straight and true to line and grade, with bottom clear of any rock points. Minimum conduit depth of pipe crown shall be 24 inches below finished grade.

C. Backfill: Support conduits with 2" sand bedding at bottom of trench. Provide sand backfill from bottom to 12" below finished grade. The top 12" to be local fine earth material free of rubble, rubbish or vegetation. Trenches shall be backfilled and compacted to 90% (per ASTM D1557) (95% under AC pavement and all roadways) of maximum dry density at optimum moisture content in layers not to exceed 6" when compacted.

3.5 PROTECTION

A. In performance of work, protect work from damage. Protect electrical equipment, stored and installed, from dust, water or other damage.

3.6 EQUIPMENT IDENTIFICATION

A. Panelboards, remote control switches, terminal boxes, etc., shall be properly identified with a descriptive nameplate. Nameplate shall be made of 3/32-inch laminated plastic with black background and white letters. Size of letters shall be 1/4-inch-high for equipment in device box or boxes 12" or smaller, and 1/2-inch-high for panelboard, terminal can, or larger items. Letters shall be machine engraved. Punched strip type nameplates and cardholders in any form are not acceptable. Nameplates shall be attached with oval head machine screws tapped into front panel.

B. Indicate type of equipment and equipment designation, ex. "PANEL-XXX", "MAIN SWITCHBOARD-XXX", "TRANSFORMER-XXX", "SIGNAL-XXX", "TV-XXX", "EF-1", "AC-1", etc.

C. Switchgear, Distribution Panels, and Panelboards shall be labeled with “FED FROM PANEL-XXX”, “PANEL-XXX”, “VOLTAGE”, and “AMPS”, and “X-PHASE”.

D. Label receptacles and light switches with printed plastic adhesive letters on cover plates. Labels shall indicate “PANEL-XXX” and “Circuit Number”.

3.7 RUST INHIBITOR

A. Channels, joiners, hangers, straps, clamps, brackets, caps, nuts and bolts and associated parts shall be plated electrolytically with zinc followed immediately thereafter by treating freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of one hundred twenty (120) hours when subjected to a standard salt spray cabinet test, or shall be hot dipped galvanized.

3.8 EQUIPMENT PADS

A. Concrete reinforced pads for mounting of equipment (i.e. switchboard, transformers, freestanding panels, etc.) shall be minimum 3000psi, 6" thick with #4 rebars at 12" on center each way. Rebars shall be centered in pad. Pad shall extend 2" beyond equipment and 1.5" above surrounding area. Backfill and compact to 95% maximum dry density at optimum moisture content in layers not to exceed 6" when compacted.

3.9 EQUIPMENT ANCHORAGE

A. Seismic Anchorage of Electrical equipment shall conform to the regulations of 2022 CBC (California Building Code) and ASCE 7-16, sections 13.3, 13.4, and 13.6. All equipment shall be braced or anchored to resist a horizontal force acting in any direction using the following criteria:

1. The total design lateral seismic force shall be determined from section 1614A of 2022 CBC and 13.3 ASCE 7-16. Forces shall be applied in the horizontal directions which results in the most critical loading for design.
2. The value if Ap (component Amplification factor) and Rp (component response modification factor) of section 13.3.1 ASCE 7-16 shall be selected from section 13.6-1 ASCE 7-16. The value of Ip (seismic importance factor) shall be selected from 13.1.3 ASCE 7-16.

B. Where anchorage details are not shown on the drawings, the field installation shall be subject to the approval of the structural engineer and the field representative of the Division of the State Architect.

3.10 ARC FLASH

A. Electrical equipment such as switchboards, panelboards, load centers, motor control centers, industrial control panels, meter centers shall be field marked to warn persons of potential electric arc flash hazards per CEC 110.16 and NFPA 70E Standard for Electrical Safety in the Workplace. Minimum label wording shall be as follows:

DANGER
Arc Flash and Shock Hazard.
Appropriate PPE Required.
Do not operate controls or open doors without appropriate
personal protection equipment.
Failure to comply may result in injury or death.

3.11 TEST

A. Test all wiring and connections for continuity and grounds; where such test indicate faulty insulation or other defects, locate, repair and retest. Balance loads at panelboards. Furnish all testing equipment.

3.12 CLOSING OF AN UNINSPECTED WORK

A. Do not allow or cause any of work installed hereunder to be covered up or enclosed before it has been inspected and approved.

B. Should any work be enclosed or covered up before it has been approved, uncover such work and after it has been inspected and approved, make all repairs necessary to restore work of others to conditions in which it was found at time of cutting, all without additional cost to Owner.

3.13 WARRANTY

A. All materials and installation shall be provided with a minimum of one (1) year warranty which shall include replacement parts, labor, retesting, and travel to and from the job site. The

warranty period shall begin after final acceptance of the project. The warranty shall cover but is not limited to the following:

1. Defective workmanship and installation.
2. All System components, devices, conduit, wires, etc.
3. Manufactured items such as light fixtures, receptacles, switchboard, panelboard, transformer, switches, etc.
4. Basic materials such as conduit, wires, boxes, cabinets, etc.

B. Certain manufactured items will have longer warranty periods. Refer to specific item and specification section for warranty information and terms.

END OF SECTION 26 00 00

SECTION 26 05 00 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Raceways.
2. Wires, cables and connectors.
3. Outlet boxes.
4. Devices and plates.
5. Safety disconnect switches.
6. Identification.
7. Surface raceway system.

B. Related Sections:

1. Section 09 91 00 "Painting and Finishing" for painting of exposed conduit, raceway, and other electrical devices to be painted.

1.2 SYSTEM DESCRIPTION

A. Provide raceways, wires, cables, connector, boxes, devices, finish plates and the like for a complete and operational electrical system.

B. Electrical Connections: Connect equipment, whether furnished by Owner or other Divisions of the Contract, electrically complete.

C. Supporting Devices: Safety factor of 4 required for every fastening device or support for electrical equipment installed. Support to withstand four times weight of equipment it supports. Bracing to comply with Seismic Zone 4 requirements.

1.3 SUBMITTALS

A. Provide shop drawings, product data and product selection for the following:

1. Raceways.

2. Wires, cables and connectors.

3. Outlet boxes.

4. Devices and plates.

5. Safety disconnect switches.

6. Identification equipment.

7. Surface raceway system.

8. Submit only one manufacturer per product.

B. Provide the following operating and maintenance instructions from the manufacturer for project closeout, see project closeout requirements in Division 1:

1. Devices and plates.

2. Safety disconnect switches.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Furnish products listed by UL or other testing firm acceptable to AHJ.

1.5 SPLICES

A. Make Connections, splices, taps and joints mechanically and electrically secure. Protect exposed wires and connecting devices with electrical tape or insulation to provide protection not less than that of the conductor.

1. Splices of #10 and smaller, including fixture tape, shall be made with Scotchlok connectors, T & B “Piggys” or equal.

2. Splices of #8 through #4 shall be split bolt service connectors “Kerneys”, T & B “Lock Tites” or equal, insulated with Scotch #88 or Okeweld four-purpose tape.

3. Splices #2 and larger shall be OZ “ST” Series insulated with Scotch fill and Scotch #88 or Okeweld.

4. Splices in underground pull boxes shall be Scotchcast, cast resin splices.

5. Wire splice devices shall be sized according to manufacturer’s recommendations.

6. Fire Alarm and Intercom shall not be spliced.

1.6 CONDUCTORS IN PANELS

A. Conductors in panels, motor control centers, etc. shall be laced with T & B Ty-raps.

B. All current carrying conductors in panels shall be labeled.

1.7 LUBRICANT

A. Lubricant for conductor installation shall be powdered soapstone, Y-er, Minerallac “Pull-In” compound or other U.L. approved lubricant. Flax soap is not approved and not permitted on the job.

PART 2 - PRODUCTS

2.1 RACEWAYS

A. Conduits:

1. Galvanized Rigid Steel Conduit (GRC):

   a. Hot-dip galvanized after thread cutting. Manufacture in conformance with Federal Specification WWC-581 and ANSI C80.1.

   b. ¾" Minimum size.

   c. Standard weight, zinc coated on outside by hot dipping or sherardized process, with either zinc coating or other approved corrosion resistant coating on the inside.

   d. Fitting shall be threaded and finished similar to conduit. Threadless fittings shall not be used. Condulets and unilets shall be **malleable** iron.

   e. Conduits connected to boxes and cabinets shall be fitted with two locknuts and insulated bushing, OA "A" Series, indoors only.

   f. Conduits not connected with locknuts and bushings shall be fitted with grounding bushing, OZ "BL" Series; U. L. approved and bonded.

   g. Conduit stubs underground shall be capped with coupling, nipple, coupling and plug.

   h. Conduits connected to boxes, cabinets, etc., outdoors, exposed to weather or in areas subject to excessive moisture shall be fitted with watertight sealing hubs of steel or malleable iron with sealing ring and insulated throat, Myers hub, T&B 370 Series, or equal.

   i. Conduits in contact with the ground must be wrapped with corrosion resistant tape of 10 mil or equiv.

   j. Erickson Couplings (three-piece threaded coupling) may be used in limited locations, where standard threaded couplings can not be used.

   k. All Thread (Running Thread) shall not be used as a Raceway

   l. All conduits installed on exterior of buildings shall be painted to match mounting surfaces.

   m. All conduits mounted under covered walkways or other areas where they are accessible shall be blocked or framed above to prevent grasping, per details in plans.

   n. All conduits shall be bonded per NEC

   o. Conduit runs shall be mechanically and electrically continuous from outlet to outlet, box to box or panel to panel. Conduit size should provide a maximum of 40% fill ratio for the relative cable runs.

   p. Conduits shall be concealed in walls, ceilings or below grade where possible. Exposed conduit shall be run parallel to room surfaces.

2. Intermediate Metal Conduit (IMC): Not permitted on this project.

3. Electrical Metallic Tubing (EMT): (**Indoor Only)**

a. ¾" Minimum size.

b. Hot-dip galvanized and chromate coated. Manufacture in conformance with Federal Specification WWC-563 and ANSI C80.3.

c. Couplings shall be steel compression gland fittings, Appleton or equal. Set screw type couplings shall not be used.

d. Connectors shall be steel compression gland fitting with insulated throat, Appleton or equal. Set screw connectors shall not be used.

e. Maximum Trade Width – Two inch (2").

f. May be used:

1. Concealed in drywall partitions.

2. Exposed in telephone equipment rooms above six-goot elevations

3. Concealed above furred ceilings

4. Exposed in Fan rooms and/or plenum chambers provided the location is dry.

g. May not be used:

1. Any Exterior Location.

2. Jointed in as continuous run with other types of conduit.

3. Any location subject to physical damage.

4. In Boiler rooms.

5. Any other areas not listed in (d) above, unless specifically otherwise noted on plans.

4. Flexible Steel Conduit: Reduced wall flexible steel conduit. Hot-dip galvanized. Manufacture in conformance with Federal Specification A-A-55810.

a. Type: Continuous, flexible interlocked galvanized inside and out, shall have smooth internal wiring channel.

b. Provide connectors with insulating bushings

c. Minimum size permitted ½" trade size.

d. Uses Permitted:

1. Final Connections to mechanical equipment, not to exceed 36".

2. Final connections to recessed fluorescent lighting, not to exceed 72".

5. Liquid Tight Flexible Metallic Conduit

    a. Same as flexible steel conduit except with heavy watertight plastic jacket.

    b. Minimum size permitted one half (1/2") trade size.

    c. Uses Permitted: In Outdoor/wet/damp locations for the final connections to mechanical equipment.

    d. Shall be used to connect portable / modular buildings between rigid stub up and building.

6. Electric Nonmetallic flexible conduit may not be used.

7. Liquid Tight Non-metallic flexible conduit may not be used.

8. Flexible Conduit, PVC Coated: Hot-dip galvanized steel. PVC chemical resistant jacket extruded to core, up to 1-inch trade size. PVC chemical resistant jacket, tubed over core, up to 4-inch trade size.

9. PVC: Class 40 heavy wall rigid PVC. Rated for use with 90C conductors. Manufacture in conformance with Federal Specification WC1094A and NEMA TC-2.

    a. Minimum size permitted one half (3/4") trade size.

    b. Joints shall be solvent cemented in accordance with the recommendations of the manufacturer.

    c. All portions shall be below grade, (minimum of 24 inches).

    d. Not suitable for conduit stub for future extension.

    e. A copper-bonding conductor shall be pulled in each power raceway and bonded to equipment at each end with approved lugs.

    f. Continuation of run into the building interior shall be with rigid steel, including elbow or bend.

    g. Connection to steel conduit shall be made with approved threaded adapters.

10. AC and MC cable is not permitted on this project.

11. Wireways and Auxiliary Gutters

    a. Shall be painted steel or galvanized steel.

    b. Shall be the size and/or shape as indicated on the drawings and shall be sized in accordance with reference codes.

    c. Wire Retainers not less than 12" on centers.

    d. Shall be bonded with listed fitting or at each section of wireway.

B. Surface Receptacle/Signal Raceway Systems:

1. Two-Channel Surface Raceway: One channel for power, the other channel for signal. Provide 20-amp multi-circuit as indicated on Drawings. Provide divider between channels. Hubble 400 series, Wiremold 4000 Series, or approved. Raceway shall be metallic.

2. Provide lengths taken from Drawings to a tolerance of 1/2 inch over raceway length between end wall surface. Do not scale from Division 16 Drawings.

3. Provide prewired receptacles every 36 inches unless otherwise noted on Drawings.

4. Provide endcaps, corner joints, tees, transition fittings and hardware for a complete installation.

5. Verify exact mounting height with Drawings.

6. Finish: Shall be of same color of wall or surface it is applied to.

C. Conduit Fittings:

1. Bushings: Malleable iron with plastic insulator lining, 150C rated.

2. Ground Bushings: Malleable iron with plastic insulating liner and aluminum grounding lug rated for copper or aluminum conductor, 150C rated.

3. EMT Connectors and Couplings:

a. Set Screw Type: Not allowed.

b. Compression Type: Zinc plated steel, insulated throat connectors, raintight up to 2 inches. Appleton TWC-S1 series or equal.

c. Fitting shall be threaded and finished similar to conduit. Threadless fittings shall not be used.

d. Conduits connected to boxes and cabinets shall be fitted with two lock nuts and insulated bushings OA “A” series, indoor only.

4. Rigid Steel Conduit Ells: PVC coated or painted with No. 51 bitumastic material, long radius ells, and minimum radius of 36 inches.

5. Expansion/Deflection Fittings:

a. EMT: Use O-Z Gedney Type TX.

b. GRC: Use O-Z Gedney Type AX, DX and AXDX.

2.2 WIRES AND CABLES

A. Copper, 600 volt rated throughout. Branch circuit conductors shall be stranded. Phase color to be consistent at all feeder terminations; A-B-C, top to bottom, left to right, front to back. Conductors 3AWG and larger, minimum insulation rating of 75C. Insulation types

THWN or THHN. Minimum insulation rating of 90C for branch circuits. Color code conductors as follows:

PHASE	208 VOLT WYE
A	Black
B	Red
C	Blue
Neutral	White
Ground	Green
Isolated Ground	Green w/yellow trace

B. SO Cable: Annealed copper conductors, 600 volt rated. Minimum Size No. 12, with ground wire. Maximum of six conductors and ground per cable. 90C rated thermoset jacket.

C. Refer to signal and communications Specification Sections for cable requirements.

D. Conductors shall be as manufactured by Anaconda, General Electric, Rome Cable Co. or approved equal.

E. Deliver to site in unbroken packages, plainly marked with the manufacturer's name, date of manufacture (not more than six months old), and voltage size and classification number.

2.3 TRANSFORMERS

A. NOT USED.

2.4 CONNECTORS

A. Copper Pads: Drilled and tapped for multiple conductor terminals.

B. Lugs: Indent/compression type for use with stranded branch circuit or control conductors. Manufacturers: Anderson, Ilsco, Panduit, Thomas & Betts, or approved.

C. Conductor Branch Circuits: Spring connectors, wire nuts, for conductors 18 through 8AWG. Manufacturers: 3M, Ideal, Scotch-Lock, or approved.

2.5 BOXES

A. General:

1. Luminaire Outlet: 4-inch octagonal box, 1-1/2 inches deep with 3/8-inch luminaire stud if required. Provide raised covers on bracket outlets and on ceiling outlets.

2. Device Outlet: Installation of one or two devices at common location, minimum 4 inches square, minimum 1-1/2 inches deep. One- or two-gang flush device raised covers. Bowers, Raco Series 681 and 686 or approved.

3. Signal and Communication Systems Outlet: 4-inch square box, 2-1/8 inches deep. One- or two-gang raised device cover. Bowers, Raco Series, or approved.

4. Multiple Devices: Three or more devices at common location. Install one-piece gang boxes with one-piece device cover. Install one device per gang. Bowers, Raco, or approved.

5. Masonry Boxes: Outlets in concrete, Bowers, Raco Series 690, or approved.

6. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

B. Weatherproof Outlet Boxes: Provide corrosion-resistant Malleable iron weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket, blank plugs and corrosion proof fasteners. Weatherproof boxes to be constructed to have smooth sides, gray finish. Appleton, Carlon, or approved equal.

C. Junction and Pull Boxes: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers. Circle AW, Hoffman, or approved.

D. Box Extension Adapter: Malleable Iron construction. Install over flush wall outlet boxes to permit flexible raceway extension to equipment Appleton, Carlon, , or approved equal.

E. Conduit Fittings: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation. O-Z Gedney, Thomas & Betts, or approved.

F. Floor Boxes:

1. Multi-Gang Box, Slab on Grade: Wiremold RFB4-CI series cast iron housing with S36CCTC series brass finish, steel flanged activation for use with matching carpet or tile insert. Rubber gasket protects interior from water and debris. Provide with two duplex receptacles and blank inserts for two future data outlets.

2. Multi-Gang Box, Slab Above Grade: Wiremold RFB4 series steel housing with S36CCTC series brass finish, steel flanged activation for use with matching carpet or tile insert. Rubber gasket protects interior from water and debris. Provide with two duplex receptacles and blank inserts for two future data outlets.

3. Multi-Gang Box, Concrete Finish Floor: Same as above, except use Wiremold S36BBTC series brass finish, steel flanged activation.

4. Single-Gang Box, Slab on Grade: Wiremold 880CM (cast-iron) series with 817 series brass finish flange suitable for both carpet and tile floors, and 828GFI brass finish cover plate insert.

5. Single-Gang Box, Slab Above Grade: Wiremold 880S (stamped steel) series with 817 series brass finish flange suitable for both carpet and tile floors, and 828GFI brass finish cover plate insert.

G. Provide floor boxes sized minimum 3-7 /16 inches deep with 1-inch factory knockouts.

2.6 WIRING DEVICES

A. Wall Switches:

1. Characteristics:

a. Toggle Type: Quiet acting, 20-amp, 120/277 volt, UL listed for motor loads up to 80 percent of rated amperage. Cooper 1221, Leviton 1221, Hubbell 1221, Pass & Seymour 20ACI.

2. Key Switches: 20 amp/120-277-volt, black key guide. Cooper 1991-L, Hubbell 1221-L, Leviton 1221-2L, Pass & Seymour 20ACI-L, or approved.

3. Finish: Ivory.

B. Wall Dimmers: Compatible with type or load controlled (i.e., electronic ballast, low voltage luminaire, and the like). Finish to match wall switches. Size dimmers to accept connected load. Do not cut fins. Where dimmers are ganged together, provide a single multi-gang coverplate. Leviton TN Series, Lutron NT Series, or approved.

C. Receptacles:

1. Finish: Same exposed finish as switches.

2. Duplex Receptacle Characteristics: Straight parallel blade, 125-volt, 2 pole, 3 wire grounding.

a. Commercial Grade: Riveted. Brass ground contact on steel mounting strap. 20 amp. Cooper BR20, Hubbell CR5362, Leviton BR20, Pass & Seymour BR20.

3. Ground Fault Circuit Interrupter (GFCI) Receptacle: Meets or exceeds UL943 (Class A GFCI), UL498. Feed through type, back-and-side wired, 20 amp, 125VAC, Cooper XGF20, Hubbell GF5362, Leviton 8898, and Pass & Seymour 2094.

4. UL Wet-Listed Covers While-In-Use: NEMA 3R when closed over energized plug. Vertical mount for duplex receptacle. Provide continuous use cover with cover capable of closing over energized cord cap with bottom aperture for cord exit.

5. Special Purpose Receptacles: Refer to Drawings for NEMA Standard Specification.

6. Receptacles and switches shall be terminated with stakon type fork on ring crimp terminal, on the side of the devices.

D. Finish Plates. Provide telephone/signal system device plates; activated outlets to have coverplates to match modular jack. Cooper, Hubbell S Series, Leviton, Pass & Seymour. Commercial grade thermoplastic, finish to match device finish.

E. Surface Covers:

1. Material: Galvanized or cadmium plated steel, 1/2-inch raised industrial type with openings appropriate for devices installed in surface outlets.

2. Cast Box and Extension Adaptors: Aluminum, with gasket, blank. One gang, Bell 240-ALF, Carlon; two gang, Bell 236-ALF, Carlon, or approved.

2.7 SAFETY DISCONNECTS

A. Toggle Type Disconnect Switches: 120-volt, 1 pole, 20 amp, 1 HP maximum. NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors.

B. Manual Motor Starters: Quick-make, quick-break. Thermal overload protection. Device labeled with maximum voltage, current and horsepower. Eaton Electrical, General Electric, Siemens, Square D Class 2510, or approved. Provide NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors.

C. Safety Switches: Heavy duty, fused type, dual rated, quick-make, quick-break with fuse rejection feature for use with Class R fuses only, unless other fuse type is specifically noted. Provide NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors. Switches clearly marked for maximum voltage, current and horsepower. Equip enclosure with defeatable cover interlock. Switches rated for maximum available fault current. Approved Manufacturers: Eaton Electrical, General Electric or Siemens.

2.8 SUPPORTING DEVICES

A. Hangers: Kindorf B-905-2A channel, H-119-D washer, C105 strap, 3/8-inch rod with ceiling flange. Conduits shall be supported with straps, with galvanized malleable split rings and rod for individual runs or with Kindorf, Unistrut, or equal channel for multiple runs

B. Concrete Inserts: Kindorf D-255, cast in concrete for support fasteners for loads up to 800 lbs.

C. Pipe Straps: Two-hole galvanized or malleable iron.

D. Luminaire Chain: Single jack chain No. 10, 40 lb. working load limit.

2.9 ELECTRICAL IDENTIFICATION

A. Engraved Labels: Melamine plastic laminate, white with black core, 1/16 inch thick, manufactured by Lamicoid. Engravers standard letter style, minimum 3/16-inch high letters, all capitals. Drill or punch labels for mechanical fastening except where adhesive mounting is necessary because of substrate. Use self-tapping stainless steel screws.

B. Conductor Numbers: Manufacturers standard vinyl-cloth self-adhesive cable and conductor markers of the wraparound type. Preprinted black numbers on yellow field. Brady, Panduit, or approved.

C. Branch Circuit Panel Schedules: Provide branch circuit identification schedules, typewritten, clearly filled out, to identify load connected to each circuit and location of load. Numbers to correspond to numbers assigned to each circuit breaker pole position.

D. Relay Panel Schedule: Provide typewritten schedule to identify the incoming circuit, the controlled load, and the controlling devices for each relay.

E. Underground Utilities Markers: Inert polyethylene plastic ribbon, 6 inches wide by 4 mil thick. Safety Red for electric power distribution. Safety Alert Orange for telephone, signal, data and cable TV. Imprint over entire length of ribbon in permanent black letters, the system description, selected from manufacturer's standard legend which most accurately identifies the subgrade system. Manufacturers: Allen Systems, Inc., Panduit Corp., or approved.

F. Circuit Breaker Identification: Provide permanent identification number in or on panelboard dead-front adjacent to each circuit breaker pole position.

PART 3 - EXECUTION

3.1 ELECTRICAL CHARACTERISTICS

A. Verify electrical characteristics of equipment prior to installation of conduits and wiring for equipment. Coordinate HVAC voltage requirements with Drawings and equipment submittals prior to rough in.

3.2 MOTOR BRANCH CIRCUIT WIRING

A. Do not install electrical equipment or wiring on mechanical equipment without approval of Architect.

B. Provide moisture tight equipment wiring and switches in ducts or plenums used for environmental air.

C. Connect motor branch circuits complete from panel to motor as required by code and manner herein described.

D. Motor starter, control devices and control wiring provided by other Divisions unless noted on Drawings.

3.3 APPLIANCE/UTILIZATION EQUIPMENT

A. Provide appropriate cable and cord cap for final connection unless equipment is provided with same. Verify special purpose outlet NEMA configuration and ampere rating with equipment supplier prior to ordering devices and coverplates.

3.4 INSTALLATION

A. Conduit:

1. Conduit Joints: Assemble conduits continuous and secure to boxes, panels, luminaires and equipment with fittings to maintain continuity. Provide watertight joints where embedded in concrete, below grade or in damp locations. Seal PVC conduit joints with solvent cement and metal conduit with metal thread primer. All rigid conduit connections to be threaded, clean and tight (metal to metal).

2. Conduit Placement:

a. Install continuous conduit and raceways for electrical power wiring and signal systems wiring. Conduit runs shall be mechanically and electrically continuous from origination to termination.

b. All thread (running thread) shall not be used as a raceway.

c. Conceal all conduits. Exposed conduits are permitted only in the following areas:

1. Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished materials.

2. Where specifically noted on the Drawings.

d. Where exposed conduits are permitted install parallel or at right angles to building lines, tight to finished surfaces and neatly offset into boxes.

e. Do not install conduits or other electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.

f. Do not install conduits on surface of building exterior, across roof, on top of parapet walls, or across floors.

g. Route raceway at least 6 inches from hot surfaces above 120F, including non-insulated steam lines, heat ducts, and the like.

3. Below Grade Conduit and Cables: Place a minimum 3-inch cover of sand or clean earth fill around the cable or conduit on a leveled trench bottom. Lay conduit on a smooth level trench bottom, so that contact is made for its entire length. Remove water from trench before electrical conduit is installed. Conduit stubs from underground shall be capped with a coupling, nipple, coupling and manufactured plug until use. Conduits shall be capped during construction.

4. Maximum Bends: Install code sized pull boxes to limit sum of bends in a run of conduit to 270 degrees.

5. Flexible Conduit: Install 12-inch minimum slack loop on flexible metallic conduit and PVC coated flexible metallic conduit. Minimum trade size: one half inch (1/2”)

6. Conduit Size: Size as indicated on Drawings. Where size is not indicated, provide conduit in minimum code permitted size for THW conductors of quantity required for complete operation. Minimum trade size 3/4 inch.

7. Fire Alarm Conduit: All fire alarm system wiring shall be in conduit, 3/4 inch minimum.

8. Provide pull cord in all empty conduits that exceed 10 feet in length or the total sum of bends exceed 90-degree radius. Pull wires shall be #12 TW in conduits 1 inch and smaller and 3/16-inch polypropylene rope in conduits 1 1/4 inch and larger.

9. Conduit Use Locations:

a. Underground: PVC.

b. Wet Locations, and Subject to Mechanical Damage: GRC.

c. Damp Locations and Locations Exposed to Rain: GRC only.

d. Cast-In-Place Concrete and Masonry: GRC and PVC. Horizontal runs of conduit in poured-in-place concrete slabs, maximum diameter of conduit is 1.25 inches.

e. Dry, Protected: GRC, EMT.

f. Sharp Bends and Elbows: GRC, EMT use factory elbows.

g. Install pull wire or nylon cord in empty raceways provided for other systems. Secure wire or cord at each end.

h. Elbow for Low Energy Signal Systems: Use long radius factory ells where linking sections of raceway for installation of signal cable.

i. Motors, recessed luminaires and equipment connections subject to movement or vibration, use flexible metallic conduit.

j. Motors and equipment connections subject to movement or vibration and subjected to any of the following conditions; exterior location, moist or humid atmosphere, water spray, oil or grease use PVC coated liquid tight flexible metallic conduit.

10. Branch Circuits: Do not change the intent of the branch circuits or controls without approval. Homeruns for 20-amp branch circuits may be combined to a maximum of six current carrying conductors in a homerun. Apply de-rating factors as required by CEC. Increase conductor size as needed.

11. Feeders: Do not combine or change feeder runs.

12. Unless otherwise indicated, provide raceway systems for lighting, power and Class 1 remote-control and signaling circuits and Class 2 and 3 remote-control signaling and communication circuits.

B. Conduit Fittings:

1. Use compression fittings in dry locations, damp and rain-exposed locations. Maximum size permitted in damp locations and locations exposed to rain is 2 inches in diameter.

2. Use threaded type fittings in wet locations, and damp or rain-exposed locations where conduit size is greater than 2 inches.

3. Use PVC coated rigid steel conduit ells for underground power and telephone service entrance conduits to each building. Use 36-inch radius ells for power service conduits and 48-inch radius ells for telephone service conduits make adjustments in trenching accordingly.

4. Telephone and signal conduit bends, where required shall have a radius of ten times the conduit trade size, unless otherwise noted.

5. Underground conduit bends shall have a minimum radius of 12 times the conduit trade size, unless otherwise noted.

6. Use insulated type bushings with ground provision at switchboards, panelboards, safety disconnect switches, junction boxes and the like that have feeders 60 amperes and greater.

7. Provide bushing or EMT connector for conduits that do not terminate in box, enclosure, or the like.

8. Conduits shall be capped during construction with manufactured plugs until use. Electrical tape is not acceptable for this use.

    a. Provide conduit expansion fittings at building expansion joints and at locations where conduit is exposed to thermal expansion and contraction. Where expansion joints are required over 1” trade size, an expansion fitting shall be used (flexible conduit may not be used). Expansion joints 1” and under may be flexible conduit

9. Condulets and Conduit Bodies: Do not use condulets and conduit bodies in conduits for signal wiring or in feeders 100 amp and larger.

C. Surface Receptacle/Signal Raceway System: Install per manufacturer's installation instructions. Install perpendicular and parallel to building lines.

D. Sleeves and Chases: Provide necessary rigid conduit sleeves, openings and chases where conduits or cables are required to pass through floors, ceiling or walls. Maintain integrity of fire-rated assemblies at penetrations of walls, ceilings or floors.

E. Conductors, Wires and Cables:

1. Conductor Installation: Install conductors in raceways having adequate, code size cross-sectional area for wires indicated. Install conductors with care to avoid damage to insulation. Do not apply greater tension on conductors than recommended by manufacturer during installation. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation. Do not use pulling compounds for installation of conductors connected to GFI circuit breakers or GFI receptacles.

2. Conductor Size and Quantity: Install no conductors smaller than 12AWG unless otherwise shown. Provide all required conductors for a fully operable system.

3. Provide dedicated neutrals (one neutral conductor for each phase conductor) in the following single-phase circuits:

    a. Dimmer controlled circuits.

    b. Isolated ground circuits.

    c. Ground fault protected circuits where a GFI breaker is used in a panelboard.

    d. Other electronic equipment which produces a high level of harmonic distortion including but not limited to computers, printers, plotters, copy machines, fax machines.

    e. There shall be no reduction of the neutral Capacity

4. Conductors in Cabinets: Hold conductors away from sharp metal edges. Cable and tree all wires in panels and cabinets for power and control. Use plastic ties in panels and cabinets. Tie and bundle feeder conductors in wireways of panelboards.

5. Exposed cable is not allowed.

F. Connectors: Retighten lugs and connectors for conductors to equipment prior to Substantial Completion.

G. Boxes:

1. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring. Boxes shall be located and placed according to architectural and structural requirements.

2. Round Boxes: Avoid using round boxes where conduit must enter through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface.

3. Boxes shall be of the shape and size best suited for the particular application and shall be supported directly to the structural members, framing or blocking by means of screws, anchors, and bolts or embedded in masonry.

4. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.

5. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.

6. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.

7. Outlet System: Provide electrical boxes and fittings as required for a complete installation. Include but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts, and all other necessary components.

8. Code Compliance: Comply with CEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to CEC, except as noted otherwise.

9. Flush Outlets in Finished Spaces: Maintain integrity of insulation and vapor barrier. Surface outlets are only acceptable in areas with surface conduit.

10. Mount center of outlet boxes as required by ADA, or noted on Drawings, the following distance above the floor:

    a. Control Switches: 48 inches.

    b. Receptacles: 18 inches.

    c. Telecom Outlets: 18 inches.

    d. Other Outlets: As indicated in other Sections of Specifications or as detailed on Drawings.

11. Coordinate all electrical device locations (switches, receptacles, and the like) with Drawings to prevent mounting devices in mirrors, back splashes, behind cabinets, and the like.

12. Boxes for special equipment shall be suitable for the particular equipment

13. Junction boxes shall be bonded to ground, unless otherwise noted.

14. Conduits entering junction boxes shall be terminated with locknuts or appropriate fittings at the junction boxes.

H. Wiring Devices:

1. Wall-Mounted Receptacles: Install with long dimension oriented vertically at centerline height shown on Drawings or specified herein.

2. Vertical Alignment: When more than one outlet is shown on Drawings in close proximity to each other, but at different elevations, align the outlets on a common vertical center line for best appearance. Verify with Architect.

I. Provide CEC-required disconnect switches whether specifically shown on Drawings or not. Provide disconnect switch in sight of each motor location unless otherwise noted. Provide disconnect switch in site of each motor controller. Motor controller disconnect equipped with lock-out/tag-out padlock provisions do not require a disconnect switch at the controlled motor location. Coordinate fuse ampere rating with installed equipment. Fuse ampere rating variance between original design information and installed equipment, size in accordance with Bussmann Fusetron 40C recommendations. Do not provide fuses of lower ampere rating than motor starter thermal units.

J. Supporting Devices:

1. Verify mounting height of all luminaires or items prior to installation when heights are not detailed.

2. Install vertical support members for equipment and luminaires, straight and parallel to building walls. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over furred or suspended ceilings.

3. Do not use other trade's fastening devices as supporting means for electrical equipment, materials or luminaires. Do not use supports or fastening devices to support other than one particular item. Conduits shall be supported independently of one another.

4. Support conduits within 18 inches of outlets, boxes, panels, cabinets and deflections. Maximum distance between supports not to exceed 7 foot spacing.

5. Securely suspend all junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from the floor above or roof structure to prevent sagging and swaying.

6. Provide seismic bracing per IBC requirements for this building location.

7. Conduits ran on roof shall be fastened to a 4x4x length as required, redwood block set in mastic on roof structure. Unistrut or equal channel shall be installed

on the blocks. The Conduit shall be individually strapped to the strut, unless otherwise noted.

8. Conduit straps for individual runs shall be secured by toggle bolts on hollow masonry, expansion shields and machine screws on solid masonry, machine screws or bolts on metal surfaces and wood screws on wood construction. Use of nails to anchor straps on wood construction is prohibited. Straps shall be one- or two-hole malleable iron or snap type steel with ribbed back, galvanized or cadmium plated. Use of perforated strap or nail type straps is prohibited.

K. Electrical Identification:

1. Graphics: Coordinate names, abbreviations and designations used on Drawings with equipment labels.

2. Underground Utilities Markers: Install continuous tape, 6 to 8 inches below finish grade, for each exterior underground raceway.

3. Conductor Identification: Apply markers on each conductor for power, control, signaling and communications circuits.

4. Install an engraved label on each major unit of electrical equipment, including but not limited to the following items: Disconnect switches, relays, override switches, service disconnects, distribution switches, branch circuit panelboards, and central or master unit of each electrical system including communication/signal systems.

5. Install engraved labels on the inside of flush panels, visible when door is opened. Install label on outside of surface panel.

6. Install signs at locations detailed or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment.

7. On the back of receptacle and switch finish plates legibly write with indelible ink pen the circuit that each device is connected to.

8. On the front of receptacle and switch finish plates provide label with the circuit that each device is connected to. Label is self-adhesive type with black letters and clear background, 18-point lettering size.

9. Non-ferrous identifying tags or pressure sensitive labels shall be securely fastened to all cables, feeders, and power circuits in pull boxes and manholes. Tags or labels shall be stamped or printed to correspond with markings on drawings or marked so that feeder or cable may be readily indentified.

10. Identify each branch circuit with wire markers. This is inclusive of wires terminated or spliced in switches, receptacles, disconnects, panelboards, switchgear, junction boxes and any other devices in which wires are terminated or spliced.

11. Junction Boxes: Provide identification labels with panel origination and circuit numbers on all junction box and enclosure covers. Four square box covers hidden above the ceiling may be marked with indelible ink marker instead of using printed labels.

L. Equipment Identification:

1. Nameplates shall be installed on electrical equipment. Equipment to be labeled shall include the following:

   a. Individual enclosures such as disconnect switches, time switches, pushbuttons, contractors, relays, motor starters, etc.

   b. Group mounted equipment such as panelboards, switchboards, and motor control devices.

   c. Individual circuit breakers of switchboards.

   d. Wall switches for lighting or other use where the control function is not self-evident.

2. Each panel shall be labeled to provide the following information as a minimum:

   a. Panel name.

   b. Size of feeder feeding the panel.

   c. Rated voltage, amps and phases.

   d. Panel feeder origination

3. Each main service switchboard and distribution panel shall be labeled to provide the following information as a minimum:

   a. Rated voltage, amps and phases.

   b. Main switch rating.

   c. Feeder circuit breaker rating with name of panel or equipment fed and size of feeder to this equipment.

   d. Panel feeder origination.

4. Nameplates shall adequately describe the item and its function or use of the particular equipment involved.

5. Nameplate material shall be laminated phenolic plastic, black front and back with white core. Engraving shall be through the outer layer. Embossed plastic pressure sensitive labels are not acceptable.

6. In lieu of plastic plates, device plates shall be engraved directly with lettering filled with black enamel.

7. Nameplates shall be securely fastened to the equipment with #4 Phillips round cadmium plated steel self-tapping screws, brass bolt, or with a plastic resin adhesive glue, Goodyear "Phiebond" or equal.

M. Building Seismic Joints:

1. Conduit Crossing Building Seismic Joints or covered: Provide box on either side of joint and flexible conduit between the box. Provide for a minimum of 12 inches of movement at the seismic joint. Rigid conduit crossings at seismic joints are not acceptable.

3.5 FIELD QUALITY CONTROL

A. Wiring Device Tests: Test wiring devices to ensure electrical continuity of grounding connections, and after energizing circuitry, to demonstrate compliance with requirements. Test receptacles for line to neutral, line to ground and neutral to ground faults. Correct any defective wiring.

B. Feeder Tests:

1. Test conductor insulation on feeders of 100 amp and greater for conformity with +1000-volt megohmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below. Notify Architect if insulation resistance is less than 1 megohm.

2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmeter test. Submit report with operating and maintenance manual.

END OF SECTION

SECTION 26 20 00 - SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metering equipment.
2. Grounding.
3. Switchboards.
4. Distribution panelboards.
5. Overcurrent protection devices.
6. Photoelectric switches.

B. Fees:

1. Pay all fees levied by serving electric utility to provide service to this project.
2. Obtain fees from serving electric utility prior to submitting a bid.

1.2 SYSTEM DESCRIPTION

A. Electrical Service System: 208Y/120, 3 phase, 4 wire, and wye. Refer to One Line Diagram for further requirements.

1. Grounding: Provide grounding and bonding of electrical service, circuits, equipment, signal and communications systems.
2. Building Ground Electrode: Coordinate placement of ground rods and grounding electrode conductor in base of building footing prior to placement
3. Performance Requirements: Supplement the grounded neutral of the secondary distribution system with an equipment grounding system to properly safeguard the equipment and personnel. Install equipment grounding such that all metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits operate continuously at ground potential and provide a low impedance path for possible ground fault currents.

1.3 SUBMITTALS

A. Provide Shop Drawings and Product Data for the Following Equipment:

1. Metering equipment.

2. Grounding.

3. Distribution panelboards.

4. Overcurrent protection devices.

B. Provide operating and maintenance instructions from the manufacturer for project closeout, see Project Closeout Requirements in Division 1.

1. Metering equipment.

2. Distribution panelboards.

3. Overcurrent protection devices.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Furnish products listed by UL or other testing firm acceptable to AHJ.

C. Conform to the requirement of the serving electric utility.

PART 2 - PRODUCTS

2.1 METERING EQUIPMENT

A. Existing,

2.2 GROUNDING MATERIALS

A. Ground Rods: Copperclad steel, 3/4-inch diameter, 20 feet long, tapered point, chamfered top. Manufacturers: Weaver, Thomas & Betts, Talley or approved.

B. Grounding Connectors: Hydraulic compression tool applied connectors or exothermic welding process connectors or powder actuated compression tool applied connectors. Mechanical type of connectors is not acceptable. Manufacturers: Burndy Hyground Compression System, Erico/Cadweld, Amp Ampact Grounding System or approved.

C. Pipe Grounding Clamp: Mechanical ground connector with cable parallel or perpendicular to pipe. Burndy GAR Series, O-Z Gedney, Thomas & Betts or approved.

D. Telecommunications Grounding Bar: 1/4-inch thick by 4-inch high by 20-inch long copper ground bar with insulators. Manufacturers: Erico/Cadweld or approved.

E. Grounding Electrode Conductor: Bare copper stranded conductor.

2.3 DRY-TYPE TRANSFORMERS

A. NOT USED

2.4 SWITCHBOARDS

A. NOT USED

2.5 DISTRIBUTION PANELBOARDS

A. Approved manufacturers: Square D Electrical, General Electric or Siemens.

B. Standards: Comply with requirements of UL 67 and NEMA PB1 in construction of switchboards. Provide short circuit current rating (Integrated Equipment Rating, IER) for panelboards. Furnish panelboards with UL label.

C. Enclosure: Flush panelboards rated 600 amp or less provide maximum enclosure depth of 5-3/4 inches. Provide galvanized metal finish.

D. Bussing: Copper bar with suitable electroplating (tin) for corrosion control at connection. Provide ground bar to accommodate specified terminal lugs. Predrill bus for bolt-on type circuit breakers.

E. Provide fully rated integrated equipment rating greater than the available fault current. See Drawings for available fault current. Minimum interrupt rating is 10,000 amps.

F. Lugs: Compression type rated for both aluminum and copper conductors.

G. Breakers: Bolt-on type.

H. Cover: Hinged door with door-in-door construction, flush lift latch and lock, two keys per panel. Key all branch circuit panelboards alike. Medium light gray finish suitable for field painting to match wall finish. Surface panels to have metal trim covers with no sharp edges or corners.

I. Where panels are mounted in finished interior areas in normal view of the building occupants, paint covers to match adjacent wall surface.

J. When indicated on Drawings, provide 200 percent rated copper neutral assembly.

2.6 OVERCURRENT PROTECTION DEVICES

A. Fusible Switches:

1. Provide fusible switches quick-make, quick-break with fuse rejection feature for Class J fuses up to 600 amp and group-mounted in panel-type construction.

2. Provide switches of 30 to 200 amp with plug-on line side connections.

3. Provide high contact pressure switch 800 to 1200 amps with shunt trip and ground fault capabilities.

4. Provide bolted pressure switch 1600 to 4000 amps with ground fault protection.

5. Provide each switch enclosed in a separate steel enclosure. The enclosure will employ a hinged cover for access to the fuses which will be interlocked with the operating handle to prevent opening the cover when the switch is in the "ON" position. Construct this interlock so that it can be released with a standard electrician's tool for testing fuses without interrupting service.

6. Provide the units with padlocking provisions in the "OFF" position and the operating handle position giving positive switch position indication, i.e. red for "ON," black for "OFF."

7. Provide switches which pass industry standard I^2t withstandability tests and fuse tests suitable for use as service equipment.

B. Fuses: Dual element, time delay, current limiting, nonrenewable type, rejection feature. UL Class J, 1/10 to 600 amp, UL Class L, above 600 amps. Provide fuse pullers for complete range of fuses. Manufacturers: Bussmann, Ferraz-Shawmut, Littelfuse, or approved.

C. Molded Case Circuit Breakers:

1. 1-, 2-, or 3-pole bolt-on, single-handle common trip, 600VAC or 250VAC as indicated on Drawings.

2. Overcenter toggle-type mechanism, quick-make, quick-break action. Trip indication is by handle position.

3. Calibrate for operation in 40C ambient temperature.

4. 15 to 150 Amp Breakers: Permanent trip unit containing individual thermal and magnetic trip elements in each pole.

5. 151 to 400 Amp Breakers: Variable magnetic trip elements. Provide push-to-trip button on cover of breaker for mechanical tripping.

6. Greater than 401 Amp: Electronic trip type with adjustments for long-time, instantaneous, and short-time functions. Provide ground fault function for breakers greater than 400 amps.

7. Provide all circuit breakers series rated when series combination ratings are applied, identify all equipment enclosures.

8. Manufacturers: Eaton Electrical, General Electric or Siemens.

2.7 FUSE CABINET

A. Provide metallic cabinet surface-mounted, with internal shelves, trim cover with hinged and latched door. Size cabinet such that spare fuses required by these Documents do not exceed 50 percent of cabinet volume. Provide engraved label to identify as Spare Fuse Cabinet. Locate in multipurpose janitors closet.

B. Manufacturers: Bussmann, Circle AW, Ferraz-Shawmut, Littelfuse, Siemens, or approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Concrete Encased Ground Electrode:

1. From the service equipment ground bus install grounding electrode conductor to footing foundation rebar.

2. Bond the grounding electrode conductor to three independent steel rebars. Each rebar's minimum length is 20 feet.

3. Protect grounding electrode conductor extension from footing/foundation to service equipment with rigid PVC conduit. Do not use metal conduit for grounding electrode conductor protection.

B. Ground Rod Electrode:

1. Coordinate placement of ground rods and interconnecting conductor in base of building concrete footing prior to placement of concrete.

2. Install 40 feet of No. 3/0 stranded bare copper conductor in base of perimeter concrete footing.

3. Lay out conductor to provide maximum exposure to earth in the perimeter footing. Do not fold conductor.

4. Bond to driven ground rods at 20 feet o.c.

5. Tap at center ground rod and extend ground electrode conductor to service ground bus. Install ground electrode conductor extension in rigid PVC conduit for physical protection.

C. Water Service Grounding: Bond building ground electrode and water service pipe to service ground bus. Connect to water pipe on utility side of isolating fittings or meters, bond across water meters.

D. Other Piping Systems: Bond gas piping system, fire sprinkler piping system and other metallic piping systems.

E. Raceway Grounding:

1. Ground all metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger grounding conductor is included with circuit, use grounding bushing with lay-in lug.

2. Connect all metal raceways, which terminate within an enclosure but without mechanical connection to the enclosure, by grounding bushings and ground wire to the grounding bus.

3. Where equipment supply conductors are in flexible metallic conduit, install stranded copper equipment grounding conductor from outlet box to equipment frame.

4. Install equipment grounding conductor, code size minimum unless noted on Drawings, in all raceway systems.

F. Feeders and Branch Circuits Grounding:

1. Install continuous insulated equipment copper ground conductors within the following circuits; feeders, circuits for computer systems and other circuits as indicated on Drawings.

2. Where installed in a continuous solid metallic raceway system and larger sizes are not detailed, provide insulated equipment ground conductors for feeders and branch circuits sized in accordance with Table 250-122.

G. Boxes, Cabinets, Enclosures and Panelboards Grounding: Bond grounding conductors to enclosure with specified conductors and lugs. Install lugs only on thoroughly cleaned contact surfaces.

H. Motors, Equipment and Appliance Grounding: Install code size equipment grounding conductor from outlet box to (motor) equipment frame or manufacturer's designated ground terminal.

I. Receptacle Grounding: Connect ground terminal of receptacle to equipment ground system by No. 12 conductor bolted to outlet box except isolated grounds where noted. Self grounding nature of receptacle devices does not eliminate conductor bolted to outlet box.

J. Telecommunications Backboard: Provide telecommunications grounding bar at each telecommunications backboard. Bond the grounding bar to service grounding bar in the main service equipment of each building with a 6AWG copper equipment grounding conductor.

K. Separately Derived Systems: Ground each separately derived system.

L. Switchboard, and Distribution Panelboards:

1. Install equipment as directed by manufacturer's installation instructions.

2. Install distribution panelboards surface or flush-mounted in accessible locations as indicated on Drawings. Maintain or exceed minimum clearances required by code.

3. Install equipment in conformance with work space requirements of CEC. Locate equipment in rooms or spaces dedicated to such equipment. Coordinate with other Divisions of work.

4. Equipment arrangement in electrical room is based on one manufacturer. Coordinate space requirements with equipment supplier. Maintain code required and manufacturer's clearances.

5. Where flush panels are installed, verify available recessing depth and coordinate wall framing with other Divisions.

6. Feeder conductors to enter directly in line with lug terminals wherever practicable. Feeder conductors, except ground and neutral, not to exceed 45 degree deflection from raceway entry to feeder phase lugs.

7. Paint panel cover and surface-mounted enclosure (if surface allowed) to match finished wall color where panels are located in finished spaces.

8. Where panels are installed flush, provide 3 1-inch spare conduits from panel to accessible space above.

9. Where panels are installed flush in fire rated walls, maintain fire rating of wall.

10. Cable and tree conductors in panelboards with plastic ties.

11. Provision for Future: Where provision for "future" or "space" is noted on Drawings, equip the space with bus connections to the future overcurrent device with suitable insulation and bracing to maintain proper short circuit rating and physical clearance. Provide buses for the ampere rating as shown for the future device.

M. Overcurrent Protection Devices:

1. Fuses: For each class and ampere rating of fuse installed, provide the following quantities of spares for quantity of fuses installed:

   a. 1 to 24: Provide 6 spare.
   b. 25 to 48: Provide 9 spare.
   c. 49 and Above: Provide 12 spare.

2. Provide testing of ground fault interrupting breakers.

N. Control Devices:

1. Install photoelectric control devices at such locations as necessary to be most effective. Avoid locating photoelectric devices in or at locations where they can be influenced by other than natural light or under eaves. Verify location of equipment with Architect.

2. Factory Testing:

   a. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.

      1) Ratio tests at the rated voltage connection and at all tap connections.

      2) Polarity and phase relation tests on the rated voltage connection.

3) No-load and excitation current at rated voltage on the rated voltage connection.

3.2 CLEANING

A. Thoroughly clean the exterior and the interior of each switchboard and distribution panelboard in accordance with manufacturer's installation instructions.

B. Vacuum construction dust, dirt and debris out of each switchboard and distribution panelboard.

C. Where enclosure finish is damaged, touch up finish with matching paint in accordance with manufacturer's specifications and installation instructions.

3.3 TESTING

A. Refer to Section 16950 for Testing procedures and requirements.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities or abandoning site utilities in place.

B. Related Sections:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities, and temporary erosion- and sedimentation-control measures.
2. Section 01 71 23 "Field Engineering" for field engineering and surveying.
3. Section 02 41 16 "Structure Demolition" for demolition of buildings, structures, and site improvements.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 REFERENCES

A. Perform on-site work in accordance with these specifications, County of San Joaquin Standard Specifications, and CalTrans Standard Specifications.

B. Perform Work within the street right-of-way in accordance with these specifications, County of San Joaquin Standard Specifications and CalTrans Standard Specifications.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable City, County, State and Federal Regulations and/or codes for environmental requirements, handling and disposal of debris, and use of herbicides.

B. County of San Joaquin is the jurisdictional agency within the public road/street right-of-ways. An encroachment permit must be obtained from the County of San Joaquin by the Contractor prior to performing any work within the road/street right-of-ways. The Contractor will be reimbursed by the Owner for the fees associated with the encroachment permit.

1.6 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.7 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.8 QUALITY ASSURANCE

A. Pre-site clearing Conference: Conduct conference at Project site.

1.9 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Public Utility Locator Service: Contact Underground Service Alert (USA) at 1-800-227-2600 for the locating of existing public utilities in the area where the project is located before site clearing.

D. Private Underground Utility Locator Service Company: In addition to contacting USA, the Contractor shall secure the services of a private Underground Utility Locating Service Company to locate existing utilities in the area where the project is located before site clearing.

E. Contact District and coordinate the location of irrigation heads and system components. District shall identify and mark with a fluorescent color paint.

F. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

G. The following practices are prohibited within tree and landscape areas identified to remain unless with written permission from the Owner:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging, unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near tree and landscape areas identified to remain.

I. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

J. The use of explosives and burning on site is prohibited.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE AND PLANT PROTECTION

A. General: Protect trees and plants identified to remain or to be relocated.

B. Provide protective barrier fence that defines the edge of the Tree Protective Zone as shown on the approved plans.

C. Provide warning signs shown in approved detail on each side or quadrant of protective barrier fence.

D. Contractor shall water and maintain plants, trees, and grass identified to remain within the construction area. This maintenance work includes periodic mowing and weeding.

E. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.3 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

B. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

A. Clear site as indicated on drawings.

B. Clear areas required for access to site and execution of work.

C. Grub site as indicated on drawings. At a minimum, grubbing should extend laterally 10 feet outside the limits of the new improvements (i.e., proposed buildings, slabs-on-grade, pavements, etc.). The grubbed material will not be suitable for use as engineered fill.

D. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Tree root systems in proposed construction areas shall be removed to a minimum depth of 2 feet below footing elevation, concrete flatwork and asphalt paving and to such an extent which would permit removal of all roots and organics larger than 1/2 inch in diameter.

E. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Backfill of tree root excavations shall not be permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proposed control of backfill placement and compaction.
2. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials.
3. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, moisture conditioned (1 to 3 percentage points above the optimum moisture content) as necessary and compact each layer to at least 90 percent of maximum dry density per ASTM D1557.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to a minimum depth of 2 to 4 inches or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas.

1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

2. The materials removed will not be suitable for Engineered Fill.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for walks, pavements, turf and grasses, and plants.
2. Excavating and backfilling for buildings and structures.
3. Aggregate base course for concrete walks and pavements.
4. Aggregate base course for asphalt paving.
5. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
2. Section 31 10 00 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.

1.3 DEFINITIONS

A. Aggregate base Course: Aggregate layer placed between the subgrade and hot-mix asphalt or concrete paving.

B. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

F. Fill: Soil materials used to raise existing grades.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

I. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 REFERENCES

A. Standard Caltrans Specifications, 2015 edition.

B. Perform on-site work in accordance with these specifications, City of Stockton Standard Specifications, and CalTrans Standard Specifications.

C. Perform Work within the street right-of-way in accordance with these specifications, City of Manteca Standard Specifications and CalTrans Standard Specifications.

1.5 SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Controlled low-strength material, including design mixture.
2. Warning tapes.

B. Samples: For the following products, in sizes indicated below:

1. Warning Tape: 12 inches long; of each color.

C. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Laboratory compaction curve according to ASTM D 1557.

D. Certification: For each borrow soil material proposed for fill and backfill shall be certified by the Contractor and supplier (to the satisfaction of the Owner) that the soils do not contain any environmental contaminates regulated by local, state, or federal agencies having jurisdiction. This certification shall consist of, as minimum, analytical data specific to source of the import material in accordance with the Department of Toxic Substances Control, “Informational Advisory, Clean Imported Fill Material,” dated October 2001.

E. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Contact Underground Service Alert (USA) at 1-800-227-2600 for the locating of existing utilities in the area where the project is located before beginning earth moving operations.

D. Seasonal Limits: Fill material shall not be placed, spread, or rolled during unfavorable weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until field tests indicated that the moisture contents of the subgrade and fill materials are satisfactory.

E. Soils beneath existing asphalt pavements, exterior flatwork, and slab areas will likely be at an elevated moisture content regardless of the time of year of construction. Such soils, intended for use as engineered fill, will require a prolonged period of dry weather and/or considerable aeration to reach a moisture content suitable for proper compaction.

F. The following practices are prohibited within landscape and tree areas identified to remain unless permission is granted by owner:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Heavy Foot traffic.
4. Erection of temporary sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Prohibit heat sources, flames, ignition sources, and smoking within landscape and tree areas identified to remain.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

1. Plasticity Index: Less than 12.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained at a minimum of 3 percentage points above optimum moisture content at time of compaction as determined by ASTM D1557 test method.

D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 10 percent passing a No. 200 sieve. Engineered fill shall be free of rock or gravel larger than 3 inches in any dimension. At least seven days prior to the placement of any fill, the engineer shall be notified of the source of materials. Samples of the proposed fill shall be obtained to determine the suitability of the materials for use as engineered fill.

1. Plasticity Index: Less than 12.
2. Minimum Electrical Resistance: 5000 ohms per cubic centimeter (when wetted to any moisture content with distilled water).

E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Class 2 Aggregate Base Course: Clean mixture of 3/4-inch natural or crushed gravel, crushed stone, and natural or crushed sand complying with Caltrans Standard Specification, Section 26, Class 2.

G. Sand: ASTM C 33; fine aggregate.

2.2 CONTROLLED LOW-STRENGTH MATERIAL (CDF)

A. Controlled Low-Strength Material (CDF): Self-compacting, low-density, flowable concrete material produced from the following:

1. Portland Cement: ASTM C 150, Type II.
2. Fly Ash: ASTM C 618, Class C or F. The fly ash shall not inhibit the entrainment of air.
3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch nominal maximum aggregate size.
4. Water: ASTM C 94.
5. Air-Entraining Admixture: ASTM C 260. Air entrainment shall not exceed 20 percent.

B. Produce conventional-weight, controlled low-strength material with 80-psi to 140-psi compressive strength when tested according to ASTM C 495.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Water: Potable water free from oil and shall contain no more than 650 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO_4. The water shall not contain an amount of impurities that will cause a reduction in the strength of the stabilized material.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Excavate to lines and levels required for construction of the work indicated on the drawings.

B. Replace damaged or displaced subsoil to same requirements as for specified fill.

C. Prevent displacement or loose material from falling into excavation, maintain soil stability. Comply with the requirements of Title 8, CCR, Sections 1539 – 1543.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation.

E. Notify Owner's Representative of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

F. Stockpile excavated material in area designated on site. Remove excess or unsuitable material from site or stockpile on site as directed. Contractor shall work with the school district and the site to determine the best location for stockpiling of excavated material.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

B. Underpin adjacent structures, which may be damaged by excavating work.

C. Excavate subsoil to accommodate site structure foundations. Footings may bear on firm native moisture conditioned soils. Footings shall be a minimum of 12 inches wide and shall have a minimum depth of 12 inches below lowest surrounding grade. When footings are located adjacent to trenches, the bottom of such footings should be at least 1 foot below an imaginary plane with an inclination of 1.5 horizontal to 1.0 vertical extending upward from the nearest bottom edge of the adjacent trench.

D. Voids resulting from the removal of any buried structures (such as irrigation structures or pipes, foundations, tanks, septic systems, sewer lines, water lines and storm drain lines) should be cleared of all loose soil and debris so that they may be backfilled during filling operations.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Comply with Title 8, CCR, Sections 1539 through 1541.

B. The soils encountered at the site are classified as Type A (Clay and Silt) and Type C (sand) soils.

C. Excavate trenches to indicated gradients, lines, depths, and elevations.

D. For trenches less than 5’-0” deep, the general contractor, at time of trenching, shall have the soil examined by a competent person to determine soil stability; unstable sidewalls shall be shored or sloped.

E. For trenches 5’-0” or deeper, the general contractor, in advance of excavation, shall secure a permit through the Division of Occupational Safety and Health. The contractor shall submit a detailed plan showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches to the School District through the Architect.

F. When sloping of sidewalls is employed the following slopes shall be followed for the soil type:

1. Type A soils: Maximum slope of 3/4H:1V (horizontal to vertical) for excavations less than 20 feet deep.
2. Type C soils: Maximum slope of 1 1/2H:1V (horizontal to vertical) for excavations less than 20 feet deep.

G. Excavate trenches to uniform widths (unless otherwise prohibited) to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 6 inches each side of pipe or conduit.

H. Trench Bottoms: Excavate trenches 4 inches deeper (minimum) than bottom of pipe and conduit elevations to allow for bedding course. Hand excavate deeper for bells of pipe.

I. Off haul trench spoils in lime treated areas as the material cannot be reused for utility trench backfill.

3.8 SUBGRADE INSPECTION

A. Notify Architect and Geotechnical Engineer when excavations have reached required subgrade.

B. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Geotechnical Engineer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 03 30 53 "Miscellaneous Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 03 30 53 "Miscellaneous Cast-in-Place Concrete."

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Place and compact initial backfill of bedding material to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations of subgrade as follows:

1. Under grass and planted areas, use native soil.
2. Under walks and pavements, use moisture conditioned native and imported engineered fill.
3. Under steps and ramps, use moisture conditioned native and imported engineered fill.
4. Under footings and foundations, use moisture conditioned native and imported engineered fill.

C. No fill shall be placed during weather conditions which will alter the moisture content of the fill materials sufficiently to make adequate compaction impossible. After placing operations have been stopped because of adverse weather conditions, no additional fill material shall be placed until the last layer compacted has been checked and found to be compacted to the specified densities.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to a minimum of 3 percentage points above optimum moisture content as determined in the ASTM D1557 test method.

1. The optimum moisture content will be determined by the Geotechnical Engineer, who will supply this information to the contractor.
2. The moisture conditioning of the subgrade is highly dependent on the time of year of construction. The Geotechnical Engineer shall be present to observe the exposed sugrade and will specify the moisture conditioning required for the subgrade.
3. If necessary to obtain uniform distribution of moisture, water shall be added to each layer by sprinkling and the soil disked, harrowed, or otherwise manipulated after the water is added.
4. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
5. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that is too wet to compact to specified dry unit weight.

B. The subgrade of exterior concrete flatwork or sidewalks should be in a moistened condition for a minimum depth of 12 inches prior to Class 2 Aggregate Base placement.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. The maximum dry density will be determined by the Geotechnical Engineer, who will supply this information to the contractor.

D. Compact soil materials to not less than the following percentages of maximum dry density according to ASTM D 1557:

1. The depth of scarification of native soils of the subgrade is highly dependent on the time of year. The Geotechnical Engineer shall be present to observe the exposed subgrade and specify the depth of scarification required. **Note: The depth of scarification listed below is for bidding purposes.**
2. Scarification of the subgrade is required where native or imported soil is placed to raise existing grade for proposed building pad and other site improvements.
3. Under structures, and steps, scarify and recompact top 12 inches (minimum) of existing subgrade and each layer of backfill or fill soil material at 90 percent relative compaction.
4. Under asphalt and concrete vehicle pavements (not walkways), scarify and recompact top 12 inches (minimum) of existing subgrade and each layer of backfill or fill soil material at 95 percent relative compaction.
5. Under concrete walkways, asphalt playgrounds, and fall protection turf, scarify and recompact top 12 inches (minimum) below subgrade and compact each layer of backfill or fill soil material at 90 percent.
6. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
7. For utility trenches not in vehicle pavement areas, compact each layer of initial and final backfill soil material at 90 percent.
8. For utility trenches within vehicle pavement areas, compact each layer of initial backfill soil material at 90 percent and compact the upper 8 inches of backfill to at least 95 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 CLASS 2 AGGREGATE BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place class 2 aggregate base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place class 2 aggregate base course under pavements, walks, and fall protection turf as follows:

1. Shape base course to required crown elevations and cross-slope grades.
2. Place base course 6 inches or less in compacted thickness in a single layer.
3. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 90 percent of maximum dry density with a minimum moisture content of at least optimum as obtainable by the ASTM D 1557 test method.

3.18 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Geotechnical Engineer.

E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area, but in no case fewer than three tests.
2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, lime treated spoils, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Hot-mix asphalt patching.
2. Hot-mix asphalt paving.

B. Related Requirements:

1. Section 02 41 16 "Structure Demolition" for demolition and removal of existing asphalt pavement.
2. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, and unbound-aggregate subbase and base courses.
3. Section 32 17 23 “Pavement Markings” for application of pavement markings on asphalt concrete paving.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.
2. Job-Mix Designs: For each job mix proposed for the Work.

B. Qualification Data: For manufacturer.

C. Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

D. Material Test Reports: For each paving material, by a qualified testing agency.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by CalTrans.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the City of Stockton, California and CalTrans for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Prime Coat: Minimum surface temperature of 60 deg F.
2. Tack Coat: Minimum surface temperature of 60 deg F.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
5. Single Course (3 inch minimum): Minimum surface temperature of 50 deg F and rising with a minimum atmospheric temperature of 45 deg F and rising at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. In accordance with CalTrans Section 39:

1. Single or Top Layer: 1/2 inch maximum, medium, Type A.
2. Lower Layer: 3/4 inch maximum, coarse, Type A.
3. Reclaimed asphalt pavement (RAP) may be used as aggregate for a part of the virgin aggregate in the asphalt paving in a quantity not exceeding 15 percent of the aggregate blend.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320, PG 64-10.

B. Asphalt Cement: ASTM D 3381/D 3381M for viscosity-graded material.

C. Cutback Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-250.

D. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

E. Water: Potable.

F. Undersealing Asphalt: ASTM D 3141; pumping consistency.

2.3 AUXILIARY MATERIALS

A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement and reclaimed, unbound-aggregate base material from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.

B. Herbicide: Commercial chemical for weed control, registered by the California EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.

C. Sand: AASHTO M 29, Grade No. 2 or No. 3.

D. Joint Sealant: AASHTO M 324, Type I, hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade is dry and in suitable condition to begin paving.

B. Verify that compacted subgrade is ready to support paving and imposed loads.

C. Verify that gradients and elevations of base are correct.

D. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Re-compact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.150.10 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

2. Coordinate treatment application with School District personnel. Provide School District a minimum of 72 hour advance notice before application to allow time for notification of parents and staff.

C. Cutback Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd.. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.

2. Protect primed substrate from damage until ready to receive paving.

3.4 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated on approved drawings.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at a minimum temperature of 250 deg F.
4. Begin applying mix on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
2. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.6 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Single Course or Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Single Course or Surface Course: 1/8 inch.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures according to AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

    a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
    b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION 32 12 16

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Curbs and gutters.
2. Walks.

B. Related Sections:

1. Section 03 30 00 "Cast-in-Place Concrete for general building applications of concrete.
2. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

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

B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Qualification Data: For installer and Design Mixture Engineer (California Registered Civil or Structural Engineer).

E. Material Certificates: Certificates shall be signed by manufacturers and contractor certifying that each material complies with, or exceeds specified requirements for the following:

1. Cementitious materials.
2. Aggregates.
3. Steel reinforcement and reinforcement accessories.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Joint fillers.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified.

1. California Building Code - Title 24, Part 2, CCR-2022 Edition with State of California Amendments.
2. ACI 301 "Specifications for Structural Concrete for Buildings." A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under CBC Section 1905A.2 and testing shall be performed in a laboratory acceptable to the enforcement agency.
3. ACI 318 "Building Code Requirements for Reinforced Concrete."
4. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

C. Concrete Testing Service: The Owner shall employ a testing laboratory acceptable to the Architect to perform material evaluation tests. Design of concrete mixes shall be by a registered civil engineer retained by the Contractor.

1. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including re-testing of rejected materials and installed work, shall be paid by Owner, but backcharged to the Contractor.
2. Testing shall be performed per Section 3.10 of these Specifications and Chapter 19A, Title 24

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615, Grade 60 for #4 and larger, and ASTM A615, Grade 40 for #3 and smaller ; deformed.

D. Plain-Steel Wire: ASTM A 82, cold drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Joint Dowel Bars: ASTM A 615, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

G. Slip Dowel System: Greenstreak two component Speed Dowel System to accept #4 x 12” to 24” long slip dowels (see drawings for size at specific details.) The Greenstreak Speed Dowel System is comprised of a reusable base and a plastic sleeve. Both pieces shall be manufactured from polypropylene plastic.

H. Tie Bars: ASTM A 615, Grade 60 for #4 and larger, and ASTM A615, Grade 40 for #3 and smaller, deformed.

I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, gray portland cement Type II

B. Normal-Weight Aggregates and Exposed Aggregate: ASTM C 33, Class 1N, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.5 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.

B. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, as specified in ACI 301 and Chapter 5 of ACI 318.

1. Use a qualified independent testing agency, acceptable to Architect, for preparing and reporting proposed mixture designs based on laboratory trial mixtures. The testing shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.
2. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.

B. Adjustment to Concrete Mixes: Mix design adjustment may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and approved by Architect before using in work.

C. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 2500 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.60.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: Plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.

1. Delete references for allowing additional water to be added to batch for material with sufficient slump. Addition of water to the batch will not be permitted.
2. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
3. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade, granular base is dry and in suitable condition to begin paving.

B. Verify that compacted subgrade, granular base is ready to support paving and imposed loads.

C. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Assemble formwork to permit easy stripping and dismantling of without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

D. Clean forms and adjacent surface to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

E. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints, score lines, and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.

2. Slip Doweled Joints (Speed Dowel System): Install dowel bars and support assemblies at joints where indicated.

   a. Attach Speed Dowel System bases to the face of the concrete forms using a double headed nail or self-tapping screw.
   b. Center of Speed Dowel System base shall be centered on form. Place edge forms plumb. Out of plumb forms will result in misaligned dowels.
   c. Prior to pouring concrete, Speed Dowel System sleeve shall be slipped over Speed Dowel System base.
   d. Pour concrete minimum of 18” from Speed Dowel System and work concrete around the Speed Dowel System. Concrete shall not be poured directly over the Speed Dowel System.
   e. Concrete forms shall be removed with Speed Dowel System bases still attached. Speed Dowel System bases may be reused.
   f. Install slip dowels to the full depth of the embedded Speed Dowel System sleeve and proceed with next concrete pour. Greasing of dowels is not required as the embedded Speed Dowel System sleeve accommodates expansion and shrinkage movements that may occur. Bent or badly sheared slip dowels shall not be used. Saw cut dowels recommended.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of no more than 30 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
5. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Control Joints: Form weakened-plane control joints, alternating with score lines and sectioning the concrete into areas as indicated. Construct weakened-plane joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.

E. Score Lines: Form score lines, alternating with weakened-plane joints and sectioning the concrete into areas as indicated. Construct score lines for a depth as indicated, as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.

F. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove ice or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface to provide a uniform, fine-line texture.

   a. Curbs and Gutters.

2. Medium-Textured Broom Finish: Draw a stiff-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, medium-line texture.

   a. Sidewalk Paving: Slopes less than 6%.
   b. Gutters in Path of Travel: Slopes less than 6%.

3. Heavy-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

   a. Sidewalk Paving: Slopes of 6% or greater.
   b. Gutters in Path of Travel: Slopes of 6% or greater.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8-inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Weakened-plane Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing laboratory to perform field tests and prepare test reports. Refer to the DSA-103 Structural Tests and Inspections Form at the end of Section 01 45 29 – Construction Observation and Testing.

B. Waiver of Batch Plant Inspection: Batch plant inspection may be waived under the following condition:

1. The concrete plan complies fully with the requirements of ASTM C94, Sections 8 and 9, and has a current certificate from the National Ready Mixed Concrete Association or another agency acceptable to DSA. The certification shall indicate that the plant has automatic batching and recording capabilities.
2. When batch plant inspection is waived the following requirements shall apply:

   a. An approved inspector of the testing laboratory shall check the first batching at the start of work and furnish mix proportions to the licensed weighmaster.

b. The licensed weighmaster shall positively identify materials as to quantity and certify each load by a ticket.
c. The ticket shall be transmitted to the project inspector by a truck driver with load identified thereon. The inspector will not accept the load without a load ticket identifying the mix. The inspector will keep a daily record of placements, identifying each truck, its load and time of receipt, and approximate location of deposit in the structure. The inspector will transmit a copy of the daily record to DSA.
d. At the end of the project, the weighmaster shall furnish an affidavit to DSA on form SSS 411-8 certifying that all concrete furnished conforms in every particular to the proportions established by mix designs.

C. Testing Services: Testing of composite samples of fresh concrete obtained according to CBC Section 1905A.6 and ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39; test one specimen at seven days and one specimen at 28 days.

D. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

E. Test results shall be reported in writing to Architect, DSA, concrete batch plant, and Contractor on same day that tests are made. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 13 73 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Joint-sealant backer materials.
3. Primers.

B. Related Requirements:

1. Section 07 92 00 "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Installation Instructions: Manufacturer’s written installation instructions for products and applications indicated for each joint-sealant product.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

E. Qualification Data: For Installer.

F. Product Certificates: For each type of joint sealant and accessory.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.

2.3 JOINT-SEALANT BACKER MATERIALS

A. Joint-Sealant Backer Materials: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within concrete paving (**PJS-1)**.

1. Joint Location:

a. Expansion and isolation joints in concrete paving.
b. Contraction joints in concrete paving.
c. Other joints as indicated.

2. Joint Sealant: Single-component, self-leveling, silicone joint sealant.
3. Joint-Sealant Color: Manufacturer's standard.

END OF SECTION 32 13 73

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes painted markings applied to asphalt pavement.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

B. Shop Drawings: For pavement markings.

1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Ennis-Flint; **EF Series Fast Dry** or a comparable product by one of the following:

1. Aexcel Inc.
2. PPG Industries.
3. Rodda Paint Co.

2.2 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

1. Colors: White and Blue as indicated on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.

B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 14 days before starting pavement marking. Place an inconspicuous test stripe to determine if new asphalt surface has cured sufficiently to allow placement of pavement markings. If the asphalt lifts or cracks during the curing of the test paint film, the asphalt has not cured sufficiently to allow placement of the pavement markings.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.

3.3 PROTECTING AND CLEANING

A. Protect pavement markings from damage and wear during remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23

SECTION 32 17 26 - TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cast-in-place detectable warning tiles.
2. Surface-applied detectable warning tiles.

B. Related Requirements:

1. Section 32 12 16 “Asphalt Paving” for asphalt paving serving as substrates for tactile warning surfacing.
2. Section 32 13 13 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of exposed finish requiring color selection.

C. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.5 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Adhesive Application:

1. Apply adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg F for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

C. Weather Limitations for Mortar and Grout:

1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.

    a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set unit pavers within 1 minute of spreading setting-bed mortar.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Deterioration of finishes beyond normal weathering and wear.
    b. Separation or delamination of materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in Chapter 11B of the 2022 California Building Code for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

B. Source Limitations: Obtain each type of tactile warning surfacing, joint material, setting material, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Engineered Plastics Inc.; Armor-Tile; (Drawings Mark) **ADA-C**.
2. Material: Vitrified polymer composite
3. Color: Federal Yellow (Federal Color No. 33538)
4. Shapes and Sizes:

    a. Rectangular panels as indicated on approved drawings.

5. Dome Spacing and Configuration: 2.35-inch spacing, in square pattern.
6. Mounting:

    a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.

B. Surface-Applied Detectable Warning Tiles: Accessible truncated-dome detectable warning concrete tiles configured for surface application on existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of tile, and beveled outside edges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Engineered Plastics Inc.; Armor-Tile; (Drawings Mark) **ADA-S**.
2. Material: Vitrified polymer composite.
3. Color: Federal Yellow (Federal Color No. 33538).
4. Shapes and Sizes:

    a. Rectangular panels as indicated on the approved drawings.

5. Dome Spacing and Configuration: 2.35-inch spacing, in square pattern.
6. Mounting: Adhered and fastened to existing concrete or new asphalt surface.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:

1. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.

C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of Chapter 11B of the 2022 California Building Code.

3.3 INSTALLATION OF DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles:

1. Concrete Paving Installation: Comply with installation requirements in Section 32 13 13 "Concrete Paving." Mix, place, and finish concrete to conditions complying with

detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.

2. Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedment in wet concrete by tamping with rubber mallet until concrete seeps through vent holes.
3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding ± 1/8 inch from flush.
4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
5. Clean tiles using methods recommended in writing by manufacturer.

B. Surface-Applied Detectable Warning Tiles:

1. Lay out detectable warning tiles as indicated and mark concrete pavement.
2. Prepare existing paving surface by grinding and cleaning as recommended by manufacturer.
3. Apply adhesive to back of tiles in amounts and pattern recommended by manufacturer, and set tiles in place. Firmly seat tiles in adhesive bed, eliminating air pockets and establishing full adhesion to pavement. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
4. Install anchor devices through face of tiles and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with top surface of mat.
5. Mask perimeter of tiles and adjacent concrete, and apply sealant in continuous bead around perimeter of tile installation.
6. Remove masking, adhesive, excess sealant, and soil from exposed surfaces of detectable warning tiles and surrounding concrete pavement using cleaning agents recommended in writing by manufacturer.
7. Protect installed tiles from traffic until adhesive has set.

3.4 CLEANING AND PROTECTION

A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 32 17 26

SECTION 33 05 00 - COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Piping joining materials.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Identification devices.
6. Grout.
7. Flowable fill.
8. Piped utility demolition.
9. Piping system common requirements.
10. Equipment installation common requirements.
11. Painting.
12. Concrete bases.
13. Metal supports and anchorages.

1.3 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

C. ABS: Acrylonitrile-butadiene-styrene plastic.

D. PE: Polyethylene plastic.

E. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.
2. Identification devices.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.

C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.2 TRANSITION FITTINGS

A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings NPS 1-1/2 and Smaller:

1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
2. Aboveground Piping: Specified piping system fitting.

C. AWWA Transition Couplings NPS 2 and Larger:

1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:

1. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint or threaded end.

E. Plastic-to-Metal Transition Unions:

1. Description: MSS SP-107, PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:

1. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 DIELECTRIC FITTINGS

A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. Description: Factory fabricated, union, NPS 2 and smaller.

a. Pressure Rating: 150 psig minimum at 180 deg F.
b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.

C. Dielectric Flanges:

1. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.

    a. Pressure Rating: 150 psig minimum.
    b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

1. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 and larger.

    a. Pressure Rating: 150 psig minimum.
    b. Gasket: Neoprene or phenolic.
    c. Bolt Sleeves: Phenolic or polyethylene.
    d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

1. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.

    a. Pressure Rating: 300 psig at 225 deg F.
    b. End Connections: Threaded.

F. Dielectric Nipples:

1. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.

    a. Pressure Rating: 300 psig at 225 deg F.
    b. End Connections: Threaded or grooved.

2.4 SLEEVES

A. Mechanical sleeve seals for pipe penetrations are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."

B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.5 IDENTIFICATION DEVICES

A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.

2. Location: Accessible and visible.

C. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.

D. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.

E. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.

F. Lettering: Manufacturer's standard preprinted captions as selected by Architect.

1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.

G. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.

1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
2. Color: Comply with ASME A13.1, unless otherwise indicated.

H. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.

1. Material: 0.032-inch- thick, polished brass.
2. Size: 1-1/2 inches in diameter, unless otherwise indicated.
3. Shape: As indicated for each piping system.

I. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

J. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
2. Thickness: 1/8 inch, unless otherwise indicated.
3. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.

K. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.
3. Brown: Energy reclamation equipment and components.
4. Blue: Equipment and components that do not meet criteria above.
5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
6. Terminology: Match schedules as closely as possible. Include the following:

a. Name and plan number.

b. Equipment service.
c. Design capacity.
d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

L. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.

1. Size: 3-1/4 by 5-5/8 inches.
2. Fasteners: Brass grommets and wire.
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

M. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.7 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, portland.
2. Density: 115- to 145-lb/cu. ft.
3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
4. Water: Comply with ASTM C 94.
5. Strength: 100 to 200 psig at 28 days.

PART 3 - EXECUTION

3.1 DIELECTRIC FITTING APPLICATIONS

A. Dry Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 and Smaller: Dielectric unions.
2. NPS 2-1/2 to NPS 12: Dielectric flanges or dielectric flange kits.

B. Wet Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 and Smaller: Dielectric couplings.

2. NPS 2-1/2 to NPS 4: Dielectric nipples.
3. NPS 2-1/2 to NPS 8: Dielectric nipples or dielectric flange kits.
4. NPS 10 and NPS 12: Dielectric flange kits.

3.2 PIPING INSTALLATION

A. Install piping according to the following requirements and utilities Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches above finished floor level.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

    a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
    b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

J. Verify final equipment locations for roughing-in.

K. Refer to equipment specifications in other Sections for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Install dielectric fittings at connections of dissimilar metal pipes.

3.5 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

3.6 PAINTING

A. Painting of piped utility systems, equipment, and components is specified in Section 09 91 00 "Painting and Finishing." Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 IDENTIFICATION

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
2. Locate pipe markers on exposed piping according to the following:

    a. Near each valve and control device.
    b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
    c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
    d. At manholes and similar access points that permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.

B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.

1. Lettering Size: Minimum 1/4 inch high for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.8 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 "Cast-in-Place Concrete

3.9 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Section 05 50 00 "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.10 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 33 05 00

SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Nonpressure transition couplings.
3. Cleanouts.
4. Drains.
5. Catch basins.

1.3 SUBMITTALS

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

B. Shop Drawings:

1. Storm water system. Include plans, elevations, sections, details, frames, covers, and grates.

C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between catch basins, piping, and proximate structures.

D. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle catch basins according to manufacturer's written rigging instructions.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect and Owner no fewer than twothree days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.2 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 CLEANOUTS

A. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.4 DRAINS

A. Cast-Iron Area Drains:

1. Description: ASME A112.6.3 gray-iron round body with anchor flange and round grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
2. Top-Loading Classification(s): Medium and Heavy Duty.
3. Grates shall have 1/2 inch max. opening per 2010 CBC path of travel requirements.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.6 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Riser Sections: 4-inch minimum thickness, 12-inch square, and lengths to provide depth indicated.
3. Top Section: 4-inch minimum thickness, 12-inch square, and lengths to provide depth indicated.
4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 15 by 15 inches with 1/2 inch max. opening per 2010 CBC path of travel requirements.
2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
3. Install piping with 36-inch minimum cover.
4. Install ABS sewer piping according to ASTM D 2321 and ASTM F 1668.
5. Install PE corrugated sewer piping according to ASTM D 2321.
6. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join ABS sewer piping according to ASTM D 2321 and ASTM D 2751 for elastomeric-seal joints.
2. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
3. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
4. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from drainage pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in drainage pipe.

1. Use Medium-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 24 by 24 by 6 inches deep. Set with tops 1 inch above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 DRAIN INSTALLATION

A. Install type of drains in locations indicated.

1. Use Medium-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service areas.

B. Embed drains in 4-inch minimum concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

3.6 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.7 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.8 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 22 05 00 "General Plumbing Systems."

B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

    a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

C. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

    a. Shielded flexible couplings for same or minor difference OD pipes.
    b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.9 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:

1. Remove manhole or structure and close open ends of remaining piping.
2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade according to Section 31 20 00 "Earth Moving."

3.10 IDENTIFICATION

A. Materials and their installation are specified in Section 31 20 00 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.11 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.

b. Option: Test plastic piping according to ASTM F 1417.
c. Option: Test concrete piping according to ASTM C 924.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with water.

END OF SECTION 33 41 00