LODI MIDDLE SCHOOL MODERNIZATION - BID SET

945 South Ham Lane, Lodi, CA 95242

3431007000

Lodi Unified School District

1305 East Vine Street, Lodi, CA 95240

BID SET



HMC Architects

CONSTRUCTION DOCUMENTS

DSA Appl #02-122910

LODI MIDDLE SCHOOL ADDITIONS AND MODERNIZATION -INCREMENT 2

945 South Ham Lane, Lodi, CA 95242

3431007000

Lodi Unified School District

1305 East Vine Street, Lodi, CA 95240



March 12, 2025

HMC Architects

LODI MIDDLE SCHOOL ADDITIONS AND MODERNIZATION - INCREMENT 2
Lodi Unified School District
Lodi, California

DSA Appl #02-122910

March 12, 2025
HMC #3431007000

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122910 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 04/11/2025

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REN. 05/31/25
STATE OF CALIFORNIA

HMC ARCHITECTS
Architect

REGISTERED PROFESSIONAL ENGINEER
GREGORY I. RICHARDS
S-4555
EXP. 12/31/2026
STRUCTURAL
STATE OF CALIFORNIA

RW Consulting Engineers, Inc.
Structural Engineer

LODI MIDDLE SCHOOL ADDITIONS AND MODERNIZATION - INCREMENT 2
Lodi Unified School District
Lodi, California

DSA Appl #02-122910

March 12, 2025
HMC #3431007000



Capital Engineering Consultants, Inc.
Mechanical/Plumbing Engineer



Capital Engineering Consultants, Inc.
Electrical Engineer

LODI MIDDLE SCHOOL ADDITIONS AND MODERNIZATION
INCREMENT 2
CONSTRUCTION DOCUMENTS
12 MARCH 2025

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 26 00 - PROCUREMENT SUBSTITUTION PROCEDURES
00 43 25 - SUBSTITUTION REQUEST FORM (DURING PROCUREMENT)
00 63 13 - REQUESTS FOR INFORMATION FORM
00 63 25 - SUBSTITUTION REQUEST FORM (DURING CONSTRUCTION) SECTION 04 21 13
00 72 00 - GENERAL CONDITIONS

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00 - SUMMARY
01 25 00 - SUBSTITUTION PROCEDURES
01 26 00 - CONTRACT MODIFICATION PROCEDURES
01 26 73 - DSA CONSTRUCTION CHANGE DOCUMENT PROCEDURES
01 29 00 - PAYMENT PROCEDURES
01 31 00 - PROJECT MANAGEMENT AND COORDINATION
01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION
01 33 00 - SUBMITTAL PROCEDURES
01 40 00 - QUALITY REQUIREMENTS
01 42 00 - REFERENCES
01 50 00 - TEMPORARY FACILITIES AND CONTROLS
01 60 00 - PRODUCT REQUIREMENTS
01 73 00 - EXECUTION
01 77 00 - CLOSEOUT PROCEDURES
01 78 23 - OPERATION AND MAINTENANCE DATA
01 78 36 - WARRANTIES
01 78 39 - PROJECT RECORD DOCUMENTS
01 81 13.71 - SUSTAINABLE DESIGN REQUIREMENTS - CALGREEN NON-RESIDENTIAL

DIVISION 02 - EXISTING CONDITIONS

02 41 19 - SELECTIVE DEMOLITION

DIVISION 03 - CONCRETE

03 10 00 - CONCRETE FORMING AND ACCESSORIES
03 20 00 - CONCRETE REINFORCING
03 30 00 - CAST-IN-PLACE CONCRETE

DIVISION 04 - MASONRY

NOT APPLICABLE

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DIVISION 05 - METALS

05 12 00 - STRUCTURAL STEEL

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 10 00 - ROUGH CARPENTRY
06 10 53 - MISCELLANEOUS ROUGH CARPENTRY
06 41 00 - ARCHITECTURAL WOOD CASEWORK
06 64 00 - PLASTIC PANELING

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 42 13.13 - FORMED METAL WALL PANELS
07 65 00 - FLEXIBLE FLASHING
07 92 00 - JOINT SEALANTS

DIVISION 08 - OPENINGS

08 11 13 - HOLLOW METAL DOORS AND FRAMES
08 14 16 - FLUSH WOOD DOORS
08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
08 56 73 - SOUND CONTROL WINDOWS
08 71 00 - DOOR HARDWARE
08 81 00 - GLASS GLAZING
08 87 00 - GLAZING SURFACE FILMS

DIVISION 09 - FINISHES

09 29 00 - GYPSUM BOARD
09 51 13 - ACOUSTICAL PANEL CEILINGS
09 51 23 - ACOUSTICAL TILE CEILINGS
09 65 00 - RESILIENT FLOORING
09 65 13 - RESILIENT BASE AND ACCESSORIES
09 68 13 - TILE CARPETING
09 84 36 - SOUND-ABSORBING CEILING UNITS
09 91 00 - PAINTING
09 93 00 - STAINING AND TRANSPARENT FINISHING

DIVISION 10 - SPECIALTIES

10 11 00 - VISUAL DISPLAY SURFACES
10 11 43 - VISUAL DISPLAY WALL PANELS
10 14 00 - SIGNAGE
10 22 53 - HANGING SCREENS
10 26 00 - WALL AND DOOR PROTECTION
10 28 00 - TOILET ACCESSORIES
10 44 00 - FIRE PROTECTION SPECIALTIES

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DIVISION 11 - EQUIPMENT

NOT APPLICABLE

DIVISION 12 - FURNISHINGS

12 22 00 - CURTAINS AND DRAPES
12 36 00 - COUNTERTOPS

DIVISION 13 - SPECIAL CONSTRUCTION

13 34 00 - FABRICATED ENGINEERED STRUCTURES

DIVISION 14 - CONVEYING EQUIPMENT

NOT APPLICABLE

DIVISION 21 - FIRE SUPPRESSION

NOT APPLICABLE

DIVISION 22 - PLUMBING

22 00 50 - BASIC PLUMBING MATERIALS AND METHODS
22 10 00 - PLUMBING PIPING SYSTEMS
22 40 00 - PLUMBING FIXTURES
22 50 00 - PLUMBING EQUIPMENT

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING(HVAC)

23 00 50 - BASIC HVAC MATERIALS AND METHODS
23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC
23 08 00 - T-24 COMMISSIONING OF HVAC
23 80 00 - HEATING, VENTILATING AND AIR CONDITIONING

DIVISION 25 - INTEGRATED AUTOMATION

NOT APPLICABLE

DIVISION 26 - ELECTRICAL

26 00 00 - ELECTRICAL GENERAL REQUIREMENTS
26 05 00 - BASIC ELECTRICAL MATERIALS AND METHODS
26 05 03 - EQUIPMENT WIRING CONNECTIONS
26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

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26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE
26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 09 00 - CONTROLS AND INSTRUMENTATION
26 27 26 - WIRING DEVICES
26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS
26 50 00 - LIGHTING

DIVISION 27 - COMMUNICATIONS

27 05 50 - INSTALLATION AND IDENTIFICATION OF SIGNAL CABLES
27 05 53 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
27 13 10 - TELEPHONE CABLING SYSTEM
27 13 20 - DATA COMMUNICATIONS SYSTEM
27 52 00 - ASSISTIVE LISTENING SYSTEM

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 31 00 - FIRE ALARM DETECTION SYSTEM

DIVISION 31 - EARTHWORK

NOT APPLICABLE

DIVISION 32 - EXTERIOR IMPROVEMENTS

NOT APPLICABLE

DIVISION 33 - UTILITIES

NOT APPLICABLE

DIVISION 34 - TRANSPORTATION

NOT APPLICABLE

DIVISION 35 - WATERWAY AND MARINE CONSTRUCTION

NOT APPLICABLE

DIVISION 40 - PROCESS INTEGRATION

NOT APPLICABLE

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DIVISION 41 - MATERIAL PROCESSING AND HANDLING EQUIPMENT

NOT APPLICABLE

DIVISION 42 - PROCESS HEATING, COOLING, AND DRYING EQUIPMENT

NOT APPLICABLE

DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT

NOT APPLICABLE

DIVISION 44 - POLLUTION CONTROL EQUIPMENT

NOT APPLICABLE

DIVISION 45 - INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT

NOT APPLICABLE

DIVISION 46 - WATER AND WASTEWATER EQUIPMENT

NOT APPLICABLE

DIVISION 48 - ELECTRICAL POWER GENERATION

NOT APPLICABLE

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SECTION 00 26 00 - PROCUREMENT SUBSTITUTION PROCEDURES

1.01 SUMMARY

A. Section Includes: Requirements for substitution requests made during procurement.

B. Related Sections:
1. Section 01 25 00 - Substitution Procedures: For requirements for substitution requests made after Contract award.

1.02 DEFINITIONS

A. Bidder: Entity or individual authorized to submit a bid in accordance with the Bidding Documents with the intention and ability to enter into an agreement with the Owner to perform the Work.

B. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

1.03 QUALITY ASSURANCE

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

1.04 PROCUREMENT SUBSTITUTIONS

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents.

B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:
1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
3. The request is fully documented and properly submitted.

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1.05 SUBMITTALS

A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:
   1. Requests for substitution of materials and equipment will be considered if received no later than 10 days prior to date of bid opening.
   2. Submit three copies of each request for consideration, using facsimile of form provided in the Project Manual.
   3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   4. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
   5. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
   6. Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
   7. Copies of current, independent third-party test data of salient product or system characteristics.
   8. Samples where applicable or when requested by Architect.
   9. Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
   10. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   11. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
   12. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
   13. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:
   1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

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a. Substitution requests submitted by entities or individuals other than Bidders will be discarded.

C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF SECTION

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SECTION 00 43 25 SUBSTITUTION REQUEST FORM (DURING PROCUREMENT)

TO: HMC Architects

Attn: __

FROM: < **Insert Bidder name**>

Specification Section: <**00 0000 - Section Title**>

Article and Paragraph(s):

Specified Item: __

Proposed Substitution: __

Required documentation for proposed substitution is attached, in accordance with Section 00 26 00 – Procurement Substitution Procedures.

The Undersigned certifies that the proposed substitution meets requirements stipulated in Section 00 26 00 – Procurement Substitution Procedures.

Submitted By (Bidder): _____

Signature _____ Date _____

Printed Name and Title _____

END OF FORM

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SECTION 00 63 13 - REQUESTS FOR INFORMATION FORM

Request for Information (RFI) Number:

Date:

TO: HMC Architects.

Attn: __

FROM: < **Insert Contractor name**>

Drawing Reference:__

Detail(s): _

Specification Section: <**00 0000 - Section Title**>

Article and Paragraph(s):

Contractor hereby requests additional information, clarification, or interpretation of the Contract Documents in accordance with Section 01 31 00 - Project Management and Coordination.

Request:

Suggested Resolution:

Contractor's Signature: __

Architect's Response:

Architect's Signature:

Response is not an authorization to proceed with work involving additional cost, time, or both.

END OF FORM

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SECTION 00 63 25 SUBSTITUTION REQUEST FORM (DURING CONSTRUCTION)

Substitution Request Number: _

TO: HMC Architects.

Attn: __

FROM: < **Insert Contractor name**>

Specification Section: <**00 0000 - Section Title**>

Article and Paragraph(s):

Contractor hereby requests acceptance of the following product or system as a substitution in accordance with Section 01 25 00 - Substitution Procedures.

Specified Item:

Proposed Substitution: __

Select one of the following:

SUBSTITUTION FOR CAUSE: Required due to change in project conditions as follows:

Unavailability of Product:

Unsuitability: _

Regulatory Change: _

Unavailability of Required Warranty:

o? SUBSTITUTION FOR CONVENIENCE: Requested substitution offers the following substantial advantage(s) to Owner:

Cost Reduction (Dollar Amount):

Time Reduction (Days): _

Other (Explain): __

The Undersigned certifies that:

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Proposed substitution meets requirements stipulated in Section 01 25 00 - Substitution Procedures.

Required documentation for proposed substitution is provided in accordance with Section 01 25 00 - Substitution Procedures.

Proposed substitution has been fully investigated and determined to be equal or superior to specified item.

Same warranty will be furnished for proposed substitution as for specified item.

Proposed substitution will have no adverse effect on other Work and will not affect or delay progress schedule.

Cost data stated is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are waived.

Proposed substitution does not affect dimensions and functional clearances.

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

Submitted By (Contractor): _____

Signature _____ Date _____

Printed Name and Title _____

Signature must be by person having authority to legally bind Contractor to the above terms. Failure to provide legally binding signature will result in retraction of approval

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ARCHITECT'S REVIEW AND ACTION

____Substitution Approved

____Substitution Approved as Noted

____Substitution Rejected

Signature: _____ Date _____

Printed Name and Title _____

Additional Comments:

_____

_____

_____

END OF FORM

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SECTION 00 72 00 - GENERAL CONDITIONS

1.01 GENERAL CONDITIONS

A. The General Conditions are available upon request.

END OF DOCUMENT

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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Contractor's use of site and premises.
   2. Coordination with occupants.
   3. Work restrictions.
   4. Specification and Drawing conventions.

1.02 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

C. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Driveways, Walkways, and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

1.03 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1.04 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

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B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Architect Owner not less than two days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner not less than two days in advance of proposed disruptive operations.
   2. Obtain Owner's written permission before proceeding with disruptive operations.

1.05 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
   3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
   4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.02 DEFINITIONS

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

1.03 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use form acceptable to Architect.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
      b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. Certificates and qualification data, where applicable or requested.
      g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.

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h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.04 QUALITY ASSURANCE

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

1.05 PROCEDURES

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

1.06 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
   1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

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a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.02 MINOR CHANGES IN THE WORK

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

1.03 PROPOSAL REQUESTS

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

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

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2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.04 CHANGE ORDER PROCEDURES

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

1.05 CONSTRUCTION CHANGE DIRECTIVE

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 26 73 – DSA CONSTRUCTION CHANGE DOCUMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing DSA Construction Change Documents for modifications of portions of the project affecting the Structural Safety, Access Compliance, and Fire and Life Safety.

B. Related Sections:
1. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling contract modifications not affecting the Structural Safety, Access Compliance, and Fire and Life Safety portions of the project.

1.02 DEFINITIONS

A. DSA: Division of the State Architect.

1.03 CONSTRUCTION CHANGE DOCUMENT

A. Construction Change Document: Architect will submit a Construction Change Document on DSA Form 140 Application for Approval of Construction Change Document to DSA. Upon DSA approval of a Construction Change Document, Architect will notify Contractor to proceed with the change in the Work, for subsequent inclusion in a Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.02 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
   1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
   2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
   1. Arrange schedule of values consistent with format of AIA Document G703.
   2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
   3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
      a. Differentiate between items stored on-site and items stored off-site.
   4. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
   5. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.03 APPLICATIONS FOR PAYMENT

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

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B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. RFIs.
   4. Project meetings.

1.02 GENERAL COORDINATION PROCEDURES

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

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor's construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.
   8. Startup and adjustment of systems.

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1.03 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      b. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

1.04 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Owner name.
   2. Owner's Project number.
   3. Name of Architect.
   4. Architect's Project number.
   5. Date.
   6. Name of Contractor.
   7. RFI number, numbered sequentially.
   8. RFI subject.
   9. Specification Section number and title and related paragraphs, as appropriate.
   10. Drawing number and detail references, as appropriate.
   11. Field dimensions and conditions, as appropriate.
   12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   13. Contractor's signature.

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14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Form bound in Project Manual.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor's means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Architect's actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five days of receipt of the RFI response.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

1.05 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

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2. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Responsibilities and personnel assignments.
   b. Tentative construction schedule.
   c. Critical work sequencing and long lead items.
   d. Designation of key personnel and their duties.
   e. Lines of communications.
   f. Use of web-based Project software.
   g. Procedures for RFIs.
   h. Procedures for testing and inspecting.
   i. Procedures for processing Applications for Payment.
   j. Distribution of the Contract Documents.
   k. Submittal procedures.
   l. Sustainable design requirements.
   m. Preparation of Record Documents.
   n. Use of the premises.
   o. Work restrictions.
   p. Working hours.
   q. Owner's occupancy requirements.
   r. Responsibility for temporary facilities and controls.
   s. Procedures for moisture and mold control.
   t. Procedures for disruptions and shutdowns.
   u. Construction waste management and recycling.
   v. Parking availability.
   w. Office, work, and storage areas.
   x. Equipment deliveries and priorities.
   y. First aid.
   z. Security.
   aa. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

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5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals.
   1. Coordinate dates of meetings with preparation of payment requests.
   2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
   3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
      a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
         1) Review schedule for next period.
      b. Review present and future needs of each entity present, including the following:
         1) Interface requirements.
         2) Sequence of operations.
         3) Resolution of BIM component conflicts.
         4) Status of submittals.
         5) Status of sustainable design documentation.
         6) Deliveries.
         7) Off-site fabrication.
         8) Access.
         9) Site use.
         10) Temporary facilities and controls.
         11) Progress cleaning.
         12) Quality and work standards.
         13) Status of correction of deficient items.
         14) Field observations.
         15) Status of RFIs.
         16) Status of Proposal Requests.
         17) Pending changes.
         18) Status of Change Orders.
         19) Pending claims and disputes.
         20) Documentation of information for payment requests.
   4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

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a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Contractor's Construction Schedule.

1.02 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file.
   2. PDF file.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

C. Construction Schedule Updating Reports: Submit with Applications for Payment.

1.03 COORDINATION

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

1.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
   2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
      a. Securing of approvals and permits required for performance of the Work.

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b. Temporary facilities.
c. Construction of mock-ups, prototypes and samples.
d. Owner interfaces and furnishing of items.
e. Interfaces with Separate Contracts.
f. Regulatory agency approvals.
g. Punch list.

3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

D. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Final Completion percentage for each activity.

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

1.05 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for commencement of the Work.

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1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Submittal schedule requirements.
   2. Administrative and procedural requirements for submittals.

1.02 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

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

1.03 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.04 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:
   1. Project name.
   2. Date.
   3. Name of Architect.
   4. Name of Contractor.
   5. Name of firm or entity that prepared submittal.
   6. Names of subcontractor, manufacturer, and supplier.
   7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
   8. Category and type of submittal.
   9. Submittal purpose and description.
   10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.

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11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

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

D. Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.05 SUBMITTAL PROCEDURES

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

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

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1.06 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams that show factory-installed wiring.
      b. Printed performance curves.
      c. Operational range diagrams.
      d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

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a. Project name and submittal number.
b. Generic description of Sample.
c. Product name and name of manufacturer.
d. Sample source.
e. Number and title of applicable Specification Section.
f. Specification paragraph number and generic name of each item.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned.Retain one returned Sample set as a project record Sample.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in three material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

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E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

F. Certificates:
   1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
   2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
   3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
   4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
   5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
   6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

G. Test and Research Reports:
   1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
   2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
   3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
   4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

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5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.07 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
    1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
    1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.08 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
    1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

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1.09 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review or discard submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned or discarded by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.02 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
   1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
   1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.

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2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall have the same meaning as testing agency.

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.03 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

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B. Delegated-Design Services Statement: Submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.04 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

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

1.05 ACTION SUBMITTALS

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

1.06 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

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

1.07 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Statement on condition of substrates and their acceptability for installation of product.
2. Statement that products at Project site comply with requirements.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Statement that equipment complies with requirements.
2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
3. Other required items indicated in individual Specification Sections.

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1.08 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

H. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

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c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
d. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architectseven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.
   a. Allow seven days for initial review and each re-review of each mockup.
7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

1.09 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

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1. Engage a qualified testing agency to perform quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Contractor-Engaged Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

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G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
   4. Facilities for storage and field curing of test samples.
   5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   6. Security and protection for samples and for testing and inspection equipment at Project site.

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

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

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SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.02 INDUSTRY STANDARDS

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

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

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1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.03 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.02 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

1.03 INFORMATIONAL SUBMITTALS

A. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
   1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
   2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
   3. Indicate methods to be used to avoid trapping water in finished work.

D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
   1. Locations of dust-control partitions at each phase of work.
   2. HVAC system isolation schematic drawing.
   3. Location of proposed air-filtration system discharge.

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4. Waste-handling procedures.
5. Other dust-control measures.

E. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
1. Methods used to meet the goals and requirements of the Owner.
2. Concrete cutting method(s) to be used.
3. Location of construction devices on the site.
4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.

1.04 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and the California Building Code.

1.05 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 TEMPORARY FACILITIES

A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

2.02 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

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PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

C. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

D. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.03 SUPPORT FACILITIES INSTALLATION

A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

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B. Parking: Provide temporary offsite or use designated areas of Owner's existing parking areas, if authorized, for construction personnel.

C. Storage and Staging: Provide temporary offsite area or use designated areas of Project site for storage and staging needs.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      a. Provide temporary, directional signs for construction personnel and visitors.
   3. Maintain and touch up signs, so they are legible at all times.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
   1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
   2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

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3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

G. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

I. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
1. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
2. Insulate partitions to control noise transmission to occupied areas.
3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
4. Protect air-handling equipment.
5. Provide walk-off mats at each entrance through temporary partition.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.

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3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.05 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.

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b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.06 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling and comparable products.

1.02 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
   3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
   1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

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C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
   1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
   2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 "Submittal Procedures."

F. Substitution: Refer to Section 01 25 00 "Substitution Procedures" for definition and limitations on substitutions.

1.03 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

1.05 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.

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2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

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2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
   a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
   a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
   b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
   a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
   a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
   b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
   a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.

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C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.
   1. Select products for which sustainable design documentation submittals are available from manufacturer.

2.02 COMPARABLE PRODUCTS

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

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 01 33 00 "Submittal Procedures."
   1. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

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C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

D. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
   1. Installation of the Work.
   2. Cutting and patching.
   3. Progress cleaning.
   4. Starting and adjusting.
   5. Protection of installed construction.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

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3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

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

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architectpromptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

3.04 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb, and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

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B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

3.05 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

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1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 01 10 00 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.

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

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.06 PROGRESS CLEANING

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

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

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D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.07 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.08 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

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B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

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SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.

1.02 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.03 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.04 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
   3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

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4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1.05 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Division 01 Section payment procedures."

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2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.06 LIST OF INCOMPLETE ITEMS

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

1.07 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

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PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 FINAL CLEANING

A. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
      a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
      b. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
      c. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
      d. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
      e. Vacuum and mop concrete.
      f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
      g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
      h. Remove labels that are not permanent.
      i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

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j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
l. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
m. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
n. Clean strainers.
o. Leave Project clean and ready for occupancy.

END OF SECTION

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SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Systems and equipment operation manuals.
   2. Systems and equipment maintenance manuals.
   3. Product maintenance manuals.

1.02 CLOSEOUT SUBMITTALS

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

B. Format: Submit operation and maintenance manuals in the following format:
   1. Submit on digital media acceptable to Architect. Enable reviewer comments on draft submittals.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training.

1.03 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

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1.04 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.

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7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.05 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

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a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.

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1.06 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 78 36 - WARRANTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for warranties on products and systems.

B. Related Sections:
   1. Section 01 77 00 "Closeout Procedures" for submitting warranties.

1.02 WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product, system, and installation warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product or system and issued in the name of the Owner or endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner for a particular product or system and issued in the name of the Owner or endorsed by manufacturer to Owner.
      a. Installation Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner for a particular product or system and issued in the name of the Owner or endorsed by installer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
   3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record specifications.

1.02 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set of marked-up record prints.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

1.03 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Accurately record information in an acceptable drawing technique.
      c. Record data as soon as possible after obtaining it.
      d. Record and check the markup before enclosing concealed installations.
      e. Cross-reference record prints to corresponding photographic documentation.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. Dimensional changes to Drawings.
      b. Revisions to details shown on Drawings.
      c. Depths of foundations.
      d. Locations and depths of underground utilities.
      e. Revisions to routing of piping and conduits.
      f. Revisions to electrical circuitry.
      g. Actual equipment locations.
      h. Duct size and routing.
      i. Locations of concealed internal utilities.

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j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Identification: As follows:
a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

1.04 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Note related Change Orders and Record Drawings where applicable.

B. Format: Submit record specifications as annotated PDF electronic file .

1.05 MAINTENANCE OF RECORD DOCUMENTS

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

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01 81 13.71 - SUSTAINABLE DESIGN REQUIREMENTS - CALGREEN NON-RESIDENTIAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General requirements and procedures for compliance with 24 CCR 11, California Green Building Standards Code (CALGreen).
   1. Some CALGreen requirements depend on product selections and may not be specifically identified as CALGreen requirements. Compliance with CALGreen requirements may be used as one criterion to evaluate substitution requests and comparable product requests.
   2. Some CALGreen requirements depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
   3. Additional CALGreen requirements not included in this specification apply to the Project.

1.02 DEFINITIONS

A. CALGreen: California Green Building Standards Code, including supplements in effect as of date of the Contract Documents unless otherwise indicated.
   1. Definitions that are part of CALGreen apply to this Section.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Respond to questions and requests from Architect about CALGreen requirements that depend on product selection or product qualities. Document responses as informational submittals.

B. When requested by enforcing agency submit substantiating documentation confirming compliance with CALGreen requirements.

C. Sustainable design submittals shall be identified and submitted separately from other submittals.

1.04 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for Construction and Demolition Waste Management: Submit documentation complying with CALGreen for one of the following:
      a. Construction Waste Management Plan.
      b. Waste Management Company.
      c. Waste Stream Reduction Alternative.

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2. IAQ testing report from testing and inspecting agency indicating results of IAQ testing and documentation that show compliance with IAQ testing procedures and requirements.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Construction and Demolition Waste Management: Achieve end-of-Project rates for salvage/recycling of not less than 65 percent of total nonhazardous solid waste generated by the Work. Comply with local construction and demolition waste management ordinance when it is more stringent.

B. Universal Waste: Universal Waste items such as fluorescent lamps and ballast, and mercury containing thermostats, as well as other California prohibited Universal Waste materials shall be disposed of properly and diverted from landfills.

C. Site-Clearing Waste: 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. If contamination by disease or pest infestation is suspected, contact the Country Agricultural Commissioner and follow its direction for recycling or disposal of the material.

2.02 MATERIALS

A. Provide products and procedures necessary to comply with CALGreen requirements in this Section. Although other Sections may specify some requirements that contribute to referenced CALGreen requirements, determine additional materials and procedures necessary to comply with CALGreen requirements indicated.

2.03 LOW-EMITTING MATERIALS

A. Adhesives and Sealants:
1. For field applications, adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with VOC content limits of authorities having jurisdiction, or the following VOC content limits:
   a. Indoor Carpet Adhesives: 50 g/L.
   b. Carpet Pad Adhesives: 50 g/L.
   c. Outdoor Carpet Adhesives: 150 g/L.
   d. Wood Flooring Adhesive: 100 g/L.
   e. Rubber Floor Adhesives: 60 g/L.
   f. Subfloor Adhesives: 50 g/L.
   g. Ceramic Tile Adhesives: 65 g/L.
   h. VCT and Asphalt Tile Adhesives: 50 g/L.
   i. Gypsum Board and Panel Adhesives: 50 g/L.

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j. Cove Base Adhesives: 50 g/L.
k. Multipurpose Construction Adhesives: 70 g/L.
l. Structural Glazing Adhesives: 100 g/L.
m. Single-Ply Roof Membrane Adhesive: 250 g/L.
n. Other Adhesive Not Specifically Listed: 50 g/L
o. PVC Welding Compounds: 510 g/L.
p. CPVC Welding Compounds: 490 g/L.
q. ABS Welding Compounds: 325 g/L.
r. Plastic Cement Welding Compounds: 250 g/L.
s. Adhesive Primer for Plastic: 550 g/L.
t. Contact Adhesive: 80 g/L.
u. Special-Purpose Contact Adhesive (Contact Adhesive That Is Used to Bond Melamine Covered Board, Metal, Unsupported Vinyl, Rubber, or Wood Veneer 1/16 Inch or Less in Thickness to Any Surface): 250 g/L.
v. Structural Wood Member Adhesives: 140 g/L.
w. Top and Trim Adhesive: 250 g/L.
x. Metal-to-Metal Adhesives: 30 g/L.
y. Plastic Foam Adhesives: 50 g/L.
z. Adhesives for Porous Materials (except Wood): 50 g/L.
aa. Wood Glues: 30 g/L.
bb. Fiberglass Adhesives: 80 g/L.
cc. Architectural Sealants: 250 g/L.
dd. Nonmembrane Roof Sealants: 300 g/L.
ee. Roadway Sealants: 250 g/L.
ff. Single-Ply Roof Membrane Sealants: 450 g/L.
gg. Other Sealants: 420 g/L.
hh. Sealant Primers for Nonporous Substrates: 250 g/L.
ii. Sealant Primers for Porous Substrates: 775 g/L.
jj. Modified Bituminous Sealant Primers: 500 g/L.
kk. Other Sealant Primers: 750 g/L.

2. Prohibited Ingredients: Adhesives and sealants must not contain the following:
   a. Chloroform.
   b. Ethylene dichloride.
   c. Methylene chloride.
   d. Perchloroethylene.
   e. Trichloroehtylene.
3. Additional Requirements: Comply with additional requirements in CALGreen for aerosol adhesives, and small unit sizes of adhesives, and sealant or caulking compounds.

B. Paints and Coatings:

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1. For field applications, paints and coatings shall comply with VOC limits of California Air Resources Board (CARB) Architectural Coatings Suggested Control Measure (SCM) below, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed shall be determined by classifying the coating as flat, nonflat, or nonflat-high gloss coating, based on its gloss.
   a. Flat Coatings: 50 g/L.
   b. Nonflat Coatings: 100 g/L.
   c. Nonflat - High Gloss Coatings: 150 g/L.
   d. Specialty Coatings:
      1) Aluminum Roof Coatings: 400 g/L.
      2) Basement Special Coatings: 400 g/L.
      3) Bituminous Roof Coatings: 50 g/L.
      4) Bituminous Roof Primers: 350 g/L.
      5) Bond Breakers: 350 g/L.
      6) Concrete Curing Compounds: 350 g/L.
      7) Concrete/Masonry Sealers: 100 g/L.
      8) Driveway Sealers: 50 g/L.
      9) Dry-Fog Coatings: 150 g/L.
      10) Faux Finishing Coatings: 350 g/L.
      11) Fire-Resistive Coatings: 350 g/L.
      12) Floor Coatings: 100 g/L.
      13) Form-Release Compounds: 250 g/L.
      14) Graphic Arts Coatings (Sign Paints): 500 g/L.
      15) High-Temperature Coatings: 420 g/L.
      16) Industrial Maintenance Coatings: 250 g/L.
      17) Low Solids Coatings: 120 g/L.
      18) Magnesite Cement Coatings: 450 g/L.
      19) Mastic Texture Coatings: 100 g/L.
      20) Metallic Pigmented Coatings: 500 g/L.
      21) Multi-Color Coatings: 250 g/L.
      22) Pretreatment Wash Primers: 420 g/L.
      23) Primers, Sealers, and Undercoaters: 100 g/L.
      24) Reactive Penetrating Sealers: 350 g/L.
      25) Recycled Coatings: 250 g/L.
      26) Roof Coatings: 50 g/L.
      27) Rust-Preventive Coatings: 250 g/L.
      28) Shellacs, Clear: 730 g/L.
      29) Shellacs, Opaque: 550 g/L.
      30) Specialty Primers, Sealers and Undercoaters: 100 g/L.
      31) Stains: 250 g/L.
      32) Stone Consolidants: 450 g/L.
      33) Swimming Pool Coatings: 340 g/L.
      34) Traffic Marking Coatings: 100 g/L.

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35) Tub and Tile Refinish Coatings: 420 g/L.
36) Waterproof Membranes: 250 g/L.
37) Wood Coatings: 275 g/L.
38) Wood Preservatives: 350 g/L.
39) Zinc-Rich Primers: 340 g/L.

2. Additional Requirements: Comply with additional requirements in CALGreen for aerosol paints and coatings.

C. Carpet Systems: All interior carpet materials, including cushion, shall comply with at least one of the following:
1. Carpet and Rug Institute's Green Label Plus program.
2. VOC-emission limits and testing requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2 (CDPH Standard Method v1.2).

D. Composite Wood Products: Composite wood products used on the interior or exterior of the building shall have formaldehyde emission rates not greater than the following specified by the California Air Resources Board (CARB), Air Toxics Control Measure (ATCM) for Composite Wood, as tested in accordance with ASTM E1333:
1. Hardwood Plywood (Veneer Core and Composite Core): 0.05 ppm.
2. Particleboard: 0.09 ppm.
3. Medium-Density Fiberboard More Than 5/16 Inch Thick: 0.11 ppm.
4. Medium-Density Fiberboard 5/16 Inch or Less in Thickness: 0.13 ppm.

E. Composite Wood Products, Tier 1: Composite wood products shall be approved by the California Air Resources Board (CARB), as no-added formaldehyde (NAF) based resins or ultra-low emitting formaldehyde (ULEF) resins.

F. Resilient Flooring Systems: Where resilient flooring is installed, at least 80 percent of floor area receiving resilient flooring shall meet the requirements comply with the following:
1. VOC-emission limits and testing requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2 (CDPH Standard Method v1.2).

G. Thermal Insulation: Thermal insulation products shall comply with VOC-emission limits and testing requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2 (CDPH Standard Method v1.2).

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H. Thermal Insulation; Tier 1: Thermal insulation products shall comply with VOC-emission limits and testing requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2 (CDPH Standard Method v1.2).

I. Acoustical Ceilings and Wall Panels: Acoustical ceilings and wall panels shall comply with VOC-emission limits and testing requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2 (CDPH Standard Method v1.2).

PART 3 - EXECUTION

3.01 CONSTRUCTION WASTE MANAGEMENT

A. Construction and Demolition Waste Management: Achieve specified rates for waste management by one of the following:
   1. Construction Waste Management Plan: Where a local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that includes the following:
      a. Identification of construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the Project or salvage for future use or sale.
      b. Determination of construction and demolition waste materials will be sorted on-site (source separated) or bulk mixed (single stream).
      c. Identification of diversion facilities where construction and demolition waste material collected will be taken.
      d. Specification of the amount of construction and demolition waste materials diverted shall be taken by weight or volume, but not by both.
   2. Waste Management Company: Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with CALGreen.
   3. Waste Stream Reduction Alternative: The combined weight of new construction disposal that does not exceed two pounds per square foot of building area shall be deemed to meet the 65 percent minimum requirement as approved by the enforcing agency.

B. Enhanced Construction Waste Reduction; Tier 1: Any mixed recyclables that are sent to mixed-waste recycling facilities shall include a qualified third-party verified facility average diversion rate.

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3.02 CONSTRUCTION IAQ MANAGEMENT

A. Cover or close openings in ducts and other related air-distribution component openings with tape, plastic, sheet metal, or other approved method before beginning dust-producing operations and maintain until dust-producing operations are complete.

B. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period, install MERV 8 filter media according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
   1. Replace all air filters immediately prior to occupancy.

END OF SECTION

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SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.

1.02 DEFINITIONS

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

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.03 MATERIALS OWNERSHIP

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

1.04 FIELD CONDITIONS

A. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

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

C. 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.

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1.05 WARRANTY

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

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.06 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 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 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 on Drawings 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.

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b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
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 and leave in place.

3.03 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

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

C. Remove temporary barricades and protections where hazards no longer exist.

3.04 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.

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2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

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

3.06 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
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.

B. Burning: Do not burn demolished materials.

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3.07 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

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PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Forms for concrete, including but not limited to slabs-on-grade, foundations, retaining walls, mechanical and electrical items, such as cleanouts, valve access boxes and pads.
2. Installation of bolts, anchors, sleeves, slots and inserts furnished under other Sections, except embedded items for mechanical items installed by trade involved.
3. Pockets in slabs to receive hollow metal door frames.

1.2 RELATED REQUIREMENTS

A. Section 01 8113, Sustainable Design Requirements, for CAL-Green general requirements and procedures.

B. Section 03 2000, Concrete Reinforcing.

C. Section 03 3000, Cast-In-Place Concrete; waterstops, formwork inspection.

D. Section 06 1000, Rough Carpentry.

E. Section 07 1900, Water Repellents.

F. Section 32 1600, Site Concrete.

1.3 REFERENCES AND STANDARDS

A. California Building Code (CBC), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).

B. California Green Building Standards Code (CAL Green), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).

C. American Concrete Institute (ACI):

1. ACI 301. Specifications for Structural Concrete.
2. ACI 303R: Guide to Cast-in-Place Architectural Concrete Practice.
3. ACI 117: Specification for Tolerances for Concrete Construction and Materials.
4. ACI 347R: Guide to Formwork for Concrete.

D. ASTM International (ASTM):

1. C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

2. D994/D994M: Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
3. D1751: Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
4. D1752: Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

E. APA - The Engineered Wood Association (APA).

1. PS-1: Voluntary Product Standard, Structural Plywood.

F. Underwriter Laboratories (UL):

1. UL723: Tests for Surface Burning Characteristics of Building Materials.

G. West Coast Lumber Inspection Bureau (WCLIB), "Standard Grading and Dressing Rules, No. 17."

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action Submittals and Informational Submittals shall be submitted in accordance with Section 01 3300, Submittal Procedures.
2. Closeout Submittals shall be submitted in accordance with Section 01 7700, Closeout Procedures.
3. Sustainable Design Submittals shall comply with the additional requirements of Section 01 8113, Sustainable Design Requirements.

B. Coordinate with all trades to insure proper placement of all items in forms and to provide proper blockouts wherever required.

C. Notify Inspector, Architect, Structural Engineer and DSA at least 2 business days prior to placing of concrete.

1.5 ACTION SUBMITTALS

A. Shop Drawings:

1. Formwork: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted.
   a. Exposed Concrete Surfaces: Show the general construction of forms including jointing, formed joints or reveals, form tie locations, and pattern of form placement, and other items that affect the exposed concrete visually.
   b. Shop drawings and calculations for formwork sealed by the design engineer in responsible charge licensed in the State of California.

2. Construction and Contraction Joints: Show the location of construction and contraction joints proposed if different from those indicated on the Drawings.

B. Product Data: Manufacturer's descriptive literature for proprietary materials and items to be used including the following:

1. Form ties.
2. Form release agent.
3. Expansion joint filler materials.
4. Other items as requested by Architect.

C. Samples: Only as requested by Architect.

1.6 INFORMATIONAL SUBMITTALS

A. Testing for Formwork Removal: Data on method for determining strength of concrete for removal of formwork proposed by Contractor when a method other than field-cured cylinders is proposed.

B. Certification that the formwork, shoring and bracing designs have been reviewed and signed by a civil or structural engineer registered in the State of California. Certification may be in the form of a letter on the engineer's letterhead and bearing the engineer's stamp.

C. Material Certificates, signed by manufacturer, certifying that each of the following items complies with specified requirements:

1. Form materials and form-release agents.
2. Joint-filler strips.

D. Sustainable Design:

1. General:
   a. Submit information necessary to establish and document compliance with the California Green Building Standards Code.
   b. Sustainable design submittals are in addition to other submittals.
2. The following information shall be provided:
   a. Paints and Coatings: Evidence of compliance that products meet maximum VOC content limits specified in Section 01 6116.

1.7 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Single-Source Responsibility: Use materials and products of one manufacturer whenever possible.

C. Materials, components, assemblies, workmanship and installation are to be observed by the Owner's Project Inspector. Work not so inspected is subject to uncovering and replacement.

D. Embedded Items: Where items, such as embedded plates, reglets, anchors, fastenings, conduit, piping and other items are supplied by other trades and included under other Sections, coordinate and obtain approval of their placement in the forms prior to placing any concrete.

E. Forms for Reuse:

1. Where applicable, construct and erect forms for reuse; withdraw projecting nails and other objects from contact surfaces before reusing; clean and completely recondition all forms prior to reuse.
2. Obtain approval for form reuse.
3. Forms will be approved for reuse provided they are straight, clean, free from nails, dirt, hardened concrete, rust, and other injurious matter and edges and surfaces are in good condition.
4. Clean and repair damage caused by placing, removal, or storage.
5. Reuse of formwork with patches or repairs that would reduce quality of exposed-to-view concrete will not be permitted.

F. Mockups:

1. General:
   a. Notify Architect 10 business days in advance of dates and times when mockups will be constructed.
   b. Retain samples of cements, sands, aggregates, and color additives used in mockups for comparison with materials used in Work.
   c. Unless otherwise instructed by the Architect, demolish and remove mockups when no longer required to be used as a benchmark for performance.
2. Free-Standing Site Mockup: Provide in location to allow for Architect’s review of appearance color, texture, and primary and secondary reveals. Comply with the following specific requirements for architectural cast-in-place concrete:
   a. Mix design shall match that proposed for use in final construction including cement. Concrete finish for mockup appearance shall match finish of Architect’s control sample or photograph.
   b. Form release agent, if required in final construction, shall also be used on mockup.
   c. Mockup will be evaluated for visual appearance of concrete, texture, workmanship, and patching methods. Include typical formwork intersection and corner treatment.
   d. One half of each mockup shall be treated with specified water and graffiti repellent.

e. Prepare at least one month before start of final concrete work to allow concrete to cure before application of repellent and Architect's observation.

f. Repairs: Representative areas of concrete shall be intentionally damaged, in the presence of the Architect, to mimic honeycombing, spalling, and other defects as may be experienced upon stripping of formwork.

1) Repair to demonstrate materials and methods proposed for repair of surface blemishes.

2) Specific procedures and materials used for patched area shall be thoroughly documented.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver form release agents in manufacturer's sealed and trademarked containers.

1.9 FIELD CONDITIONS

A. Measurements: Make and be responsible for field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

B. Where concrete bases or foundations are required for equipment furnished by other Sections, verify dimensions for equipment furnished before concrete is placed.

C. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

A. Design and construction of concrete formwork is the responsibility of the Contractor.

B. Construct formwork for erection in satisfactory sequence and removal without damage to the resulting concrete surface.

C. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.

D. Form to produce smooth concrete - straight, plumb and true to plane. Concrete out of line, level or plumb will be rejected.

E. Allowable Tolerances:

1. Variations from plumb and designated building lines shall not exceed the tolerances specified in ACI 117.
2. Conform to suggested tolerances of ACI 347.

F. Sustainable Design:

1. VOC emissions for field-applied paints and coatings must comply with limits specified in Section 01 6116.

2.2 FORM MATERIALS

A. General:

1. Form materials shall be new at start of job.
2. Intent is to produce high-quality concrete construction with minimum defects owing to joints, deflection of forms, roughness of forms, or other concrete defects caused by poor form materials or workmanship.
3. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which are warped or delaminated, or require more than minor patching of contact surfaces, shall not be reused.

B. Rough Form Finish Surfaces: Plywood, lumber, metal, or other material of sufficient strength and stiffness to hold concrete properly in place, and prevent leakage of mortar.

C. Smooth Non-Architectural Form Finish Surfaces: APA rated, five-ply 5/8 inch minimum, B-B Plyform, Class I or II as required by strength and tolerance requirements, Exterior Grade, edge sealed, with mill-oiling treatment omitted.

D. Earth Forms:

1. Unless otherwise indicated on Drawings, concrete for foundations and grade beams which are to permanently remain below grade may be placed directly against neatly cut excavated surfaces.
2. Earth banks shall be sufficiently stable to maintain shape and width of footing shall be increased by 2 inches. When this condition applies, form top edges to prevent sloughing of earth into footings.
3. Maintain minimum reinforcing steel clearances indicated on Drawings.
4. Concrete exposed to view on exterior shall be formed to minimum depth of 6 inches below finished grade.

E. Framing: At Contractor option, subject to meeting necessary strengths and surface tolerances.

2.3 FORM ACCESSORIES

A. Form Ties:

1. General:
   a. Provide units that will leave no metal within 1-1/2 inches of concrete surface.
   b. Ties for exposed concrete shall be of same type throughout Project.

c. Wire ties and wood spreaders for footings, shallow foundations, and other surfaces totally concealed below grade are to be used only upon specific acceptance of Architect.

2. Typical: Snap off metal of fixed length, designed to prevent spalling of concrete upon removal.

3. At Architectural Concrete: 1-1/2 inches long x 1-1/4 inches diameter cones, “A-2” Plastic Cones” with “A-4 Hex Head Snap Tie” by Dayton Superior, or equal.

B. Spreaders: Metal. Wood spreaders, if used, shall not remain in concrete.

C. Form-Release Agents: Commercially manufactured agents that will prevent formwork absorption of moisture, and prevent bond with concrete,

1. Exposed Concrete: Agents shall provide clean, stain-free concrete release and not interfere with future-applied coatings and finishes.

2. Unexposed Concrete: Contractor's option.

D. Construction and Control Joints:

1. Acceptable Materials:
   a. Minimum 26 gauge galvanized steel shapes to form tongue-and-groove joint.
   b. 24-gauge galvanized steel splice plates.
   c. 16-gauge galvanized steel stakes.
2. Manufacturers and Products: As follows, or equal.
   a. “Burke Joint Key” by Meadow Burke.
   b. “Pro-Key” by BoMetals, Inc.

E. Chamfer Strips, Reveals, and Score Marks:

1. Extruded polyvinyl chloride specially produced for concrete work; Greenstreak, or equal.
2. Material usages shall be consistent for each application.

F. Expansion Joint Material: Preformed 1/2 inch manufactured for use as concrete expansion joint material and conforming to ASTM D994/D994M, ASTM D1751, or ASTM D1752.

G. Other Embedded Items: Use waterstops, sleeves, inserts, anchors, reglets, dovetail anchor slots, and other embedded items of the material and design indicated and specified under other Sections.

PART 3 - EXECUTION

3.1 PREPARATION

A. Vertical and Horizontal Controls:

1. Establish and maintain bench marks, lines, or controls throughout construction.
2. Forms and falsework shall be to final elevations compatible with finished floor elevations and form material.

B. Coordinate with other Sections, and provide for openings, sleeves, chases, reglets, pipes, recesses, nailers, anchors, ties, inserts, and similar embedded items.

C. Coordinate with Section 03 3000, Cast-in-Place Concrete, for requirements governing embedment and sleeving of pipes and conduit.

3.2 CONSTRUCTION OF FORMS

A. General:

1. Metal or wood stakes are not allowed in areas to be concreted.
2. Build forms to shapes, lines, grades and dimensions indicated and to maintain tolerances required by ACI 301 and as scheduled.
3. Construct wood forms of sound lumber, straight and rigid, thoroughly braced, mortar tight, and of such strength that pressure of concrete and movement of workers and equipment will not displace them.
4. Arrange forms to allow proper erection sequence and to permit form removal without damage to concrete.
5. Visible waves in exposed concrete surfaces after stripping of forms may result in rejection of that portion of concrete.
6. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.
7. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.
8. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.
9. Form bevels, grooves and recesses to neat, straight lines.

B. Formwork for Smooth Exposed Concrete:

1. Forms shall be constructed of plywood.
2. Plywood panels shall be clean, smooth, uniform in size, and free from damaged edges or faces, including holes other than those required for form ties.
3. Use full-size (4-x-8-foot) panels wherever possible.
4. Keep size of smallest forms to minimum of 18 inches.
5. Make plywood panel pattern regular and symmetrical, joints plumb or level, horizontal joints continuous.
6. Align form ties vertically and horizontally.
7. Block plywood edges which do not occur at bearing points to eliminate joint offsets.

C. Framing and Bracing:

1. Framing, bracing, and supporting members shall be of ample size and strength to safely carry, without excessive deflection (exceeding allowable tolerances), dead and live loads to which formwork may be subjected. Space close enough to prevent apparent bulging or sagging of forms.
2. Shores and struts shall be provided with positive means of adjustment and settlement shall be taken up during construction.

D. Form Ties:

1. Form ties shall be of sufficient strength and quantity to prevent spreading of forms.
2. Ties for exposed concrete surfaces shall be arranged symmetrically and shall be aligned both vertically and horizontally. Do not stagger.
3. Slope tie-wires downward to outside of wall.

E. Slab Control Joints:

1. Install tongue and groove joint material for interior slabs and elsewhere as indicated on Drawings.
2. Maximum area between joints is limited to 225 square feet, maximum length between joints is limited to 16 feet, aspect ratio of length to width is limited to 1.25 to 1.
3. Contractor can set joint spacing within above limits to suit placing schedule except that all joints specifically shown on Drawings must be set as so located.
4. Where joint spacing is not shown, submit proposed locations to suit slab-on-grade detail shown on the Drawings.

F. Expansion Joints:

1. Provide expansion joints where shown or noted on Drawings.
2. Place joint filler in straight line with edge held back to specified dimension from finish surface and secured to formwork or previously placed construction.
3. Use fiber type joints typically and hold edge back 1/8 inch from concrete surface.
4. Use cork type joint fillers at sealed joints and hold edge back 1/2 inch. After curing concrete, carefully clean, prime and fill joints with sealant to 1/8 inch from the finished surface in accordance with manufacturer's recommendations.

G. Cleanouts:

1. Provide cleanouts along bottom of walls or elsewhere as required to permit thorough cleaning of loose dirt, debris, and foreign material.
2. Cleanouts shall not be apparent on exposed concrete surfaces.

H. Corners:

1. Chamfer corners of exposed concrete surfaces, unless noted otherwise on the Drawings.
   a. Obtain chamfers by placing 3/4-inch-x-3/4-inch moldings in forms.
   b. Pieces shall be longest lengths possible.
   c. Miter joints.
2. Do not bevel re-entrant corners or edges of formed joints of concrete unless otherwise shown.

I. Form Release Agent: Before placement of reinforcing steel, thoroughly clean forms and coat faces of forms to prevent absorption of moisture from concrete and to facilitate removal of forms.

1. Apply I in conformance with manufacturer's written directions.
2. Before re-using form material, inspect, clean thoroughly, and recoat.
3. Avoid starved areas or excessive applications.
4. Seal cut edges.

J. Tolerances: In addition to ACI 303.1 limits on form-facing panel deflection, limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, in accordance with the form offset Categories as follows at the locations indicated:

1. Exterior-Architectural Concrete: Class A, 1/8 inch.
2. Exterior-Concealed by Other Materials: Class C, 1/2 inch.
3. Interior-Vertical Exposed Architectural Concrete: Class A, 1/8-inch.
4. Interior-Vertical Exposed Non-Architectural: Class B, 1/4 inch.
5. Interior-Underside of Slabs Where Exposed: Class B, 1/4 inch.
6. Interior-Concealed and Non-Architectural: Class C, 1/2 inch.

3.3 FALSEWORK

A. Contractor shall be fully responsible for proper strength, safety, and adequacy for falsework, supports, and bearing surfaces used on and in connection with the work.

B. Falsework shall support imposed loads without deformation, deflection, or settlement.

C. Construct shores for soffits of joists to permit removal of forms without removal of shores.

3.4 RESHORING AND BACKSHORING

A. During reshoring and backshoring, do not allow concrete in beam, slab, column, or any structural member to be loaded with combined dead and construction loads in excess of the specified design loads and concrete compressive strength.

B. Place reshores and backshores in sequence with stripping operations.

C. Tighten reshores and backshores to carry the required loads without overstressing the concrete members. Leave them in place until required tests indicate the concrete compressive strength has attained the minimum value specified.

3.5 CLEANING

A. Remove wood chips, sawdust and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove water from excavations.

B. Leave no wood in concrete, except nailers.

3.6 ADJUSTING

A. During and immediately after concrete placing, tighten forms, posts and shores.

B. Readjust to maintain grades, levels and camber.

3.7 FORM REMOVAL

A. Remove forms and falsework so as to ensure safety of structure. Do not remove supports until members have sufficient strength to support their own weight and superimposed loading with proper factor of safety.

B. Remove forms for exposed concrete so as to avoid damage to finish. Do not use pinch bars and similar tools for prying against exposed surfaces.

C. After concrete is placed, the following times shall elapse before removal of forms or shoring, unless approved otherwise by the Architect.

1. Vertical Forms of Foundations: Form 5 days.
2. Walls and Columns: Form 10 days.
3. Edges of Slabs and Sides of Footings: Form 7 days.
4. Concrete Columns and Beam Soffits: Form 10 days, shores 21 days after placement or until concrete achieves its 28 day design compressive strength, whichever is longer.

D. Upon removal of forms, remove bolts, wires, clamps, rods, and similar items not necessary to finished work to minimum 1 inch from surface. Remove them in such a way as to eliminate danger of rust stains from form-tie materials or other unprotected ferrous materials embedded in or adjacent to exposed concrete surfaces.

E. Where forms are removed in less than 7 days, or 14 days for walls, curing shall be continued as follows:

1. Loosen form ties and run water down inside of form to keep concrete wet.
2. Immediately following form removal thoroughly wet surface.
3. Continue curing in accordance with provisions of Section 03 3000, Cast-in-Place Concrete.

END OF SECTION

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Last Updated: March 22, 2021

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Reinforcing for concrete.
2. Reinforcing for concrete masonry units
3. Installation accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 4523, Testing and Inspection Services.

B. Section 03 1000, Concrete Forming and Accessories.

C. Section 03 3000, Cast-In-Place Concrete.

D. Section 04 2200, Concrete Masonry Unit.

E. Section 32 1600, Site Concrete.

1.3 REFERENCES AND STANDARDS

A. California Building Code (CBC), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).

B. California Green Building Standards Code (CAL Green), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).

C. American Concrete Institute (ACI):

1. ACI 117: Tolerances for Concrete Construction and Materials.
2. ACI 301: Specifications for Structural Concrete.
3. ACI 315: Manual of Standard Practice for Detailing Reinforced Concrete Structures.
4. ACI 318: Building Code Requirements for Reinforced Concrete (ASTM A706-22A).

D. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Standard Practice.

E. ASTM International (ASTM):

1. A706/A706M-22A: Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
2. A1064/A1064M: Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

F. American Welding Society (AWS):

1. D1.1/D1.1M: Structural Welding Code – Steel.
2. D1.4/D1.4M: Structural Welding Code – Steel Reinforcing Bars.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action Submittals and Informational Submittals shall be submitted in accordance with Section 01 3300, Submittal Procedures.
2. Closeout Submittals shall be submitted in accordance with Section 01 7700, Closeout Procedures.

B. Coordination:

1. Coordinate reinforcing with the other work affected by these operations, such as forms, electrical work, mechanical work, and structural steel concrete.
2. Coordinate resolution of or procedures whenever pipes, conduits, sleeves, and other construction interferes with placement.

1.5 ACTION SUBMITTALS

A. General: Review does not imply or state that fabricator has correctly interpreted the construction documents.

B. Shop Drawings: Show complete bending and placing details of reinforcement.

1. Details of reinforcement not covered shall be in accordance with ACI 318 and ACI 315.
2. Detailing, fabricating, and spacing of reinforcement shall be equal or superior to ACI 315, unless otherwise indicated.
3. Check Architectural, Structural, Mechanical, and Electrical Drawings for anchor-bolt schedules and locations, anchors, inserts, conduits, sleeves, and other items to be cast in concrete. Reinforcing steel shall not interfere with placement of such embedded items.
4. Do not fabricate or place reinforcing steel until shop drawings have been reviewed and returned to Contractor.
5. Review of shop drawings will not constitute relief of responsibility for errors or for failure in accuracy and complete placing of the work.

C. Product Data:

1. General:
   a. List and complete descriptive data of products proposed for use.
   b. Include manufacturer's specifications, installation instructions, and maintenance instructions.
2. Mechanical Splices: Types of mechanical splices proposed for use. Include the latest ICC-ES Reports (ESR) for threaded or sleeve-type splices to verify compliance with specified requirements.
3. Headed Bars or Terminators: Types of headed bars or terminators proposed for use. Include the latest ESR to verify compliance with the specified requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Statement of qualifications for fabricator, installer, and welders.

B. Welding Procedures and Qualifications: Description of reinforcement weld locations, welding procedures, and welder qualifications when welding is permitted.

C. Certificates: Certified copies of mill test reports for each bundle of reinforcing bars delivered to the site, indicating physical and chemical properties for each heat. In addition, show correlation between a specific heat number and specific sizes from that heat number and location in which those bars will be placed.

1.7 CLOSEOUT SUBMITTALS

A. Guarantee: Submit Subcontractor’s guarantee.

1.8 QUALITY ASSURANCE

A. Welder Qualifications:

1. Welders shall be qualified in the last six months in accordance with the American Welding Society, AWS D1.4.
2. Welding procedures qualified by others and welders qualified by another employer may be acceptable as permitted by AWS D1.4.
3. If re-qualification is required, the cost of these qualification tests shall be borne by the Contractor.

B. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

C. Single-Source Responsibility: Use materials and products of one manufacturer whenever possible.

D. Materials, components, assemblies, workmanship and installation are to be observed by the Owner's Project Inspector. Work not so inspected is subject to uncovering and replacement.

E. Conflicting requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or these specifications, the provisions of the more stringent shall govern.

F. Shop Quality Assurance:

1. General:
   a. Testing and inspection of shop-fabricated components or assemblies will be the same as specified for field quality assurance in Part 3.
   b. Identify reinforcing and verify reinforcement is of type and grade specified.
2. Testing:
   a. Reinforcing shall be tested in accordance with CBC Section 1910A.2.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcing bars in bundles with tags showing quantity, grade, size, and suitable identification to allow checking, sorting, and placing.

1. Identification of steel shall be maintained after bundles are broken.
2. Bundles of flat sheets and rolls of welded wire fabric shall be tagged showing quantity, style designation, width, and length.

B. Store reinforcement at site in a manner to prevent excessive rusting or fouling that will interfere with bond.

1.10 FIELD CONDITIONS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

A. Allowable Tolerances: Fabrication and placement tolerances shall be in accordance with ACI 117.

2.2 REINFORCING STEEL

A. Reinforcing bars shall conform to ASTM A615/A615M, Grade 60 for No. 5 and larger, Grade 40 for No. 4 and smaller, or ASTM A706/A706M. For reinforcing bars conforming

to ASTM A706, which will be welded, furnish a report of the chemical analysis for each heat of the bars.

B. Plain and Deformed Wire: ASTM A1064/A1064M.

C. Spiral Reinforcement: Plain, cold-drawn wire conforming to ASTM A1064 if indicated as wire, or hot-rolled rods conforming to ASTM A706/A706M if indicated as bars.

2.3 ACCESSORIES AND ADDITIONAL MATERIALS

A. Bar Supports: In accordance with CRSI Manual of Standard Practice; types and sizes as required for the conditions of the installation.

1. For exposed to view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are hot-dipped galvanized, plastic. or stainless steel, in accordance with CRSI Class 1.
2. Provide precast concrete blocks not less than 4 inches square when supporting reinforcing steel on ground. Precast concrete blocks shall have a compressive strength equal to that of surrounding concrete.

B. Mechanical Couplers: **mechanical couplers in accordance with the provisions of ACI 318**

1. Couplers shall match or exceed the strength of rods they connect.

C. Deformed Bar Anchors: Nelson Stud Welding Division of Stanley Engineered Fastening, Stud Welding Products, Inc., or equal.

D. Headed Bars or Terminators: Headed Reinforcement Corp., or equal.

1. Net head area at least 4 times the bar area.

E. Anchor Bolts and Anchor Rods:

1. Nuts: As recommended by ASTM specification for corresponding anchor rod or bolt.
2. Washers: As recommended by ASTM specification for corresponding anchor rod or bolt.

2.4 FABRICATION

A. Refer to the Drawings for bar sizes, number of bars, and placing details.

B. Conform to requirements of Chapter 25 and Section 26.6 of ACI 318 except lap bar splices shall be as indicated on the Drawings.

C. Bending:

1. Minimum bend diameters and hook extensions as shown on the Drawings.
2. Reinforcing bars are to be bent cold unless heating is permitted.
3. Do not bend or kink reinforcing except as shown on the Drawings.

D. Spirals: Provide a minimum of 1-1/2 finishing turns top and bottom.

E. Install mechanical couplers and headed bars in accordance with manufacturer's recommendations and ICC ES Report.

F. Deformed Bar Anchors:

1. Detailing of bends, hooks, and similar items, to comply with requirements for reinforcing bars.
2. Install deformed bar anchors in accordance with the manufacturer's recommendations and the requirements of AWS D1.1.

G. Steel reinforcement shall not be bent or straightened in a manner that will injure material. Bars with kinks or bends not shown on Drawings are not permitted.

1. Heating of bars for bending will not be permitted.
2. Straightening or rebending will not be permitted without approval by the Architect and DSA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine excavations in accordance with requirements specified in Division 31, Earthwork, prior to placing reinforcement.

B. Wherever embedded items interfere with placement of reinforcement, notify Architect and obtain written approval before placing any concrete.

3.2 INSTALLATION

A. Bar Reinforcement:

1. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations.
2. Do not exceed the tolerances defined in ACI 117 or ACI 318 Section 26.6 or CBC Section 1905A.1.
3. Where Drawings do not show the spacing of the reinforcing, provide minimum clear spacing in conformance with ACI 318 Section 25.2 not less than 4/3 times the maximum size aggregate.
4. Dowels shall be tied securely in place before concrete is deposited.

5. Do not install kinked, bent or misplaced reinforcing.
6. When necessary to move reinforcement beyond the specified placing tolerances to avoid interference with other reinforcement or embedded items, submit the resulting arrangement of reinforcement for acceptance.
7. Continue reinforcement across construction joints at least equal to lap development lengths on either side of the joint unless otherwise detailed.

B. Welded Wire Fabric (WWF) Reinforcement:

1. Install welded wire fabric in lengths as long as practicable.
2. Lap adjoining pieces a minimum of 18 inches and at least one full mesh.
3. Offset laps of adjoining widths to prevent continuous laps in either direction.

C. Field Bending:

1. Field bending or straightening shall be in accordance with ACI 301 Section 3.3.2.8.
2. Do not re-bend reinforcement that has previously been bent within 6 inches of new bend except as shown on the Drawings or explicitly allowed by the Architect.

D. Splices:

1. General:
   a. Unless otherwise shown on Drawings, splice top reinforcing at midspan between supports, splice bottom reinforcing at supports, and stagger splices at adjacent splices whenever possible.
   b. Bar laps shall be wired together.
2. Lap splice lengths as shown on the Drawings
   a. Lap Splices in Concrete: Lap splice lengths not less than 75 bar diameters, 36 inches minimum for #6 bars and smaller. 93 bar diameters for #7 bars and larger.
   b. Lap Splices in CMU: Lap splice lengths not less than 75 bar diameters; 40 inches minimum, unless otherwise shown.
      1) Bars of size #8 and larger shall be spliced by welding or by approved mechanical connectors.
      2) Mechanical connectors shall develop 125 percent of the specified yield strength of the bar in tension.
3. Welded Splices: Butt and complete penetration weld per AWS D1.4 to develop, in tension, not less than 125 percent of bar yield strength.

E. Anchor Bolts and Rods:

1. Supervise setting of anchor bolts required for wood framing and anchor rods required for erection of structural steel to ensure correct installation and location.

2. Anchor bolts and rods must be securely held in place and aligned in a true straight line prior to and during concrete placement.
3. Anchor bolts and rods may not be, pushed into wet concrete.

F. Cover:

1. As a minimum, provide the concrete cover shown on the Drawings.
2. Tolerances on concrete cover shall meet the requirements of ACI 117.

3.3 CLEANING

A. At time of placing concrete, clean reinforcement and other embedded items thoroughly of loose rust, mill scale, oil, grease, and other foreign material that reduces or destroys bond.

B. Rust and mill scale that is “tight” to the bar will be allowed to remain.

C. Rust that is flaky or easily removed, such as by dropping or striking with a hammer, indicates excessive rust. Such bars shall be cleaned of rust, and not be used unless found to comply with ACI 318 Section 26.6.1.2.

D. Where there is a potential of rust staining adjacent finish surfaces, take necessary steps to prevent staining.

3.4 FIELD WELDING

A. Welding of reinforcing bar shall be performed only where indicated on the Drawings and in compliance with AWS D1.4. Welding of reinforcement is to be inspected in accordance with CBC Section 1705A.3.2.

3.5 FIELD QUALITY CONTROL

A. Approval of reinforcing steel, after installation, must be received from the Owner’s Project Inspector. Architect, Structural Engineer, and DSA.

1. Notify Inspector, Architect, Structural Engineer, and DSA at least two business days before concrete is to be poured or reinforcing is covered up.
2. Inspection will include the following:
    a. Reinforcing for conformance with ACI 318 Sections 25.2, 25.3, 25.5, 25.6, and 36.6.
    b. Verification that anchor bolts, anchor rods and other embedded items are held firmly in position prior to placing concrete.
    c. Re-bent bars for signs of cracking or fracture.
    d. Installation of deformed bar anchors in accordance with Section 7.1 of AWS D1.1 and corresponding ESR.
    e. Mechanical coupler installation in accordance with corresponding ESR.

3. The following reinforcing steel work will be considered defective and shall be removed and replaced by the Contractor at no additional cost to the Owner:
   a. Bars with kinks or bends not shown on the Drawings.
   b. Bars injured due to bending or straightening.
   c. Bars heated for bending.
   d. Reinforcement not placed in accordance with the drawings and/or specifications.
4. Allow sufficient time to perform any corrective actions prior to concrete pour.

B. Owner's Testing Agency will provide the following:

1. Inspection of welding except that cost of welding inspection required beyond 3 days total of shop and field welding will be backcharged to Contractor.
2. Provide continuous inspection during any field bending of reinforcement.

C. Keep responsible reinforcing person on job to maintain position of reinforcing as concrete is placed.

END OF SECTION

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Last Updated: July 13, 2021

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete. Provide single space between subparagraphs.
2. Curing, surface treatments, and finishing performed at time of concrete placement.
3. Remedial treatments to exposed-to-view formed surfaces.
4. Aggregate base.

1.2 RELATED REQUIREMENTS

A. Section 01 4520, Concrete Floor Moisture Content and PH Testing.

B. Section 01 6116, Volatile Organic Compound (VOC) Restrictions; for VOC limits pertaining to adhesives, sealants, fillers, primers, and coatings.

C. Section 01 8113, Sustainable Design Requirements, for CAL-Green general requirements and procedures.

D. Section 03 1000, Concrete Forming and Accessories.

E. Section 03 2000, Concrete Reinforcing.

F. Section 03 3600, Concrete Finishes; surface treatments to cured concrete.

G. Section 07 1900, Water Repellants.

H. Section 07 2616, Below-Grade Vapor Retarder.

I. Section 09 9623, Graffiti-Resistant Coatings.

J. Section 32 1600, Site Concrete; concrete pavement and walks.

1.3 REFERENCES

A. California Building Code (CBC), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).

B. California Green Building Standards Code (CAL Green), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).

C. American Concrete Institute (ACI) Publications and Standards: Standards and manuals listed refer to the latest edition as of the issue date of this Project Manual.

1. ACI 117: Specification for Tolerances for Concrete Construction and Materials.
2. ACI 211.5R: Guide for Submittal of Concrete Proportions.
3. ACI 301: Specifications for Structural Concrete.
4. ACI 302.1R: Guide to Concrete Floor and Slab Construction.
5. ACI 302.2R: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
6. ACI 305R: Guide to Hot Weather Concreting.
7. ACI 306R: Guide to Cold Weather Concreting.
8. ACI 318: Building Code Requirements for Structural Concrete and Commentary.

D. ASTM International:

1. C33/C33M: Standard Specification for Concrete Aggregates.
2. C94/C94M: Standard Specification for Ready-Mixed Concrete.
3. C143/C143M: Standard Test Method for Slump of Hydraulic-Cement Concrete.
4. C150/C150M: Standard Specification for Portland Cement.
5. C171: Standard Specification for Sheet Materials for Curing Concrete.
6. C260/C260M: Standard Specification for Air-Entraining Admixtures for Concrete.
7. C494/C494M: Standard Specification for Chemical Admixtures for Concrete.
8. C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
9. C989/C989M: Standard Specification for Slag Cement for Use in Concrete and Mortars.
10. C1059/C1059M: Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
11. C1077: Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
12. C1107/C1107M: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
13. C1602/C1602M: Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
14. D4263: Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
15. D5084: Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
16. E329: Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
17. E1155: Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action Submittals and Informational Submittals shall be submitted in accordance with Section 01 3300, Submittal Procedures.
2. Closeout Submittals shall be submitted in accordance with Section 01 7700, Closeout Procedures.
3. Sustainable Design Submittals shall comply with the additional requirements of Section 01 8113, Sustainable Design Requirements.

B. Pre-installation Meeting: Schedule at least 30 calendar days prior to start of concrete work. Meeting shall be attended by Contractor, Contractor's Superintendent, Architect, Project Structural Engineer, Project Inspector, party responsible for concrete design mix, party responsible for field quality control, concrete subcontractor, ready-mix concrete producer, and others whose work may affect quality of concrete, to coordinate related requirements, materials, scheduling, and procedures.

1. Notify participants at least 10 business days before conducting meeting. Include a written agenda of meeting with notice.
2. Review mix designs, material selections, and procedures to be followed in performing the work.
3. Review in detail job conditions, schedule, construction sequence, installation requirements, and quality of completed installation including Architect's expectations related to floor flatness, including installation of casework.
4. Review in detail the means of protecting completed work during remainder of construction period.
5. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish a copy of record to each participant.

1.5 ACTION SUBMITTALS

A. Shop Drawings:

1. Show proposed location of construction joints and cold joints when different or in addition to those shown on the Drawings.
2. Provide section cut details through each proposed type of joint including shear keys, joint dowels, waterstops and other accessories as required.

B. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.

C. Product Data: Submit manufacturer's descriptive literature for the following products showing compliance with Specifications, compliance with referenced standards, manufacturer's recommendations, and known limitations.

D. Qualification Data: For independent testing agency.

E. Sustainable Design:

1. General:
   a. Submit information necessary to establish and document compliance with the California Green Building Standards Code.
   b. Sustainable design submittals are in addition to other submittals.
2. The following information shall be provided:
   a. Paints and Coatings: Evidence of compliance that products meet maximum VOC content limits specified in Section 01 6116.

F. Sample of manufacturer's warranty.

G. Record of Pre-installation Meeting.

1.6 CLOSEOUT SUBMITTALS

A. Weighmaster shall furnish certificate of compliance to DSA in accordance with CBC, Section 1705A.3.3, to DSA, certifying that all concrete furnished conforms to the ingredients and proportions established by mix designs.

1.7 QUALITY ASSURANCE

A. Permeability Testing Agency Qualifications: An independent agency in business for at least 10 years that employs field personnel trained and qualified according to ASTM C1077 and ASTM E329 for testing indicated.

B. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

C. Single-Source Responsibility: Use materials and products of one manufacturer whenever possible.

D. Materials, components, assemblies, workmanship and installation are to be observed by the Owner's Project Inspector. Work not so inspected is subject to uncovering and replacement.

E. Conflicting Requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or these specifications, the more stringent provisions shall govern.

F. Finish work defaced during the concrete pour and finishing shall be replaced at no extra cost to the owner.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the Work.

C. Transport, store and handle in strict accordance with the manufacturer's written recommendations.

D. Store cement in weathertight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.

E. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregate. Use only one supply source for each aggregate stockpile.

1.9 FIELD CONDITIONS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report any discrepancies to Architect before proceeding with work.

B. Placing in Hot Weather: Comply with ACI 305R.

1. Concrete shall not exceed 85 degrees F at time of placement.
2. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface drying.
3. Concrete shall be kept wet continuously after placement until implementation of curing procedure in accordance with this Specification.

C. Placing in Cold Weather: Comply with ACI 306R.

1. Protect from frost or freezing.
2. No antifreeze admixtures are permitted.
3. When deposited concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F.
4. Concrete shall be maintained at temperature of at least 50 degrees F for not less than 72 hours after placing or until it has thoroughly hardened.

1.10 WARRANTY

A. Manufacturer: In addition to the Contractor’s and Sub Contractor’s Guarantee, furnish Owner with manufacturer’s fully executed written warranty for moisture barrier admixture against moisture related failure, including all finish floor materials and labor, for a period of 2 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Concrete shall conform to provisions of the latest edition of the referenced ASTM and ACI publications except as modified by the requirements included herein.

B. Concrete slabs shall conform to ACI 302.1R and ACI 302.2R.

C. Sustainable Design:

1. VOC emissions for field-applied paints and coatings must comply with limits specified in Section 01 6116.

2.2 CONCRETE MATERIALS

A. General Requirements:

1. Cement and aggregates shall be from constant sources and shall have proven history of successful use with one another.
2. Sources of cement and aggregate shall remain unchanged throughout work, unless Architect accepts request for change made at least 10 days prior to scheduled date of placing.
3. Ready-mixed concrete shall meet requirements of ASTM C94/C94M.
4. Deviations in properties of materials tested by Owner's Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by Testing Agency.

B. Portland Cement: ASTM C 150/C150M, Type II, in accordance with ACI 318 Section 3.2.

1. The cement shall be of the same brand and type and from the same plant of manufacture as the cement used in the concrete represented by the submitted field test records or used in the trial mixtures.
2. For Architectural Concrete, use one brand of cement throughout project, unless otherwise acceptable to the Architect.

C. Supplementary Cementitious Materials:

1. Fly Ash: Western Fly Ash, conforming to ASTM C 618 for Class N or Class F materials and in accordance with CBC Section 1903A.6.
   a. Class C is not permitted.
   b. Proportions: Not more than 15 percent (by weight) may be substituted for portland cement.
2. Ground Granulated Blast Furnace Slag (GGBFS): ASTM C989.
3. Contractor to comply with all applicable regulations concerning testing for, and limiting content of, hazardous materials in supplementary cementitious materials.

D. Concrete Aggregates:

1. General:
   a. Aggregates shall be well-graded, containing a range of intermediate sizes between sand and the maximum aggregate size.

b. Aggregates shall be free of alkali-silica reactivity. Evaluate aggregates for reactivity in accordance with ASTM C33/C33M Appendix X1.

c. For concrete exposed to view in completed structure, provide aggregates from a single source.

d. Maximum Aggregate Size: In accordance with notes on the Structural Drawings.

2. Normal Weight Aggregates: Conform to ASTM C33/C33M, except as modified by this Section.

E. Water: Clean and free from deleterious amounts of acids, alkalis, scale, or organic materials, and conforming to requirements of ACI 318 Section 26.4.1.3 and ASTM C1602/C1602M.

2.3 ADMIXTURES

A. General:

1. The use of admixtures shall be the responsibility of the Contractor.
2. When more than one admixture is used in the mix, furnish satisfactory evidence to the Architect that the admixtures to be used are compatible in combination with the cement and aggregates.
3. Provide only one brand of each type of admixture.
4. Admixtures shall be free of calcium chloride and thiocyanate (not more than 0.05 percent chloride ions).
5. The following types of admixtures are approved.

B. Moisture Barrier Admixture: “Concure” Silicate free “Concure Plus S/F” by Concure Systems, Phoenix, AZ, 480-820-7171, or equal.

1. Proportions: 14 ounces per 100 pounds of cementitious materials.
   a. Admixture is used in lieu of a portion of the mix water, not in addition to the mix water.
   b. For purposes of calculating, fly ash, slag, fill, and similar materials are to be considered cementitious.
2. Admixture shall be plant mixed in accordance with the manufacturer’s instructions. Truck and on-site mixing is not permitted.

C. Water Reducing Admixture: Conforming to ASTM C494/C494M and ACI 318 Section 3.6; “WRDA 64” by GCP Applied Technologies, or equal.

1. Admixture must receive prior approval by the Architect, Structural Engineer, and the Testing Lab, and shall be included in original design mix.

D. Air-entraining Admixture: Conforming to ASTM C260/C260M and CBC Section 1904A.1; “Daravair 1000 by” by GCP Applied Technologies, or equal.

E. Coloring Agent at Interior Concrete: Concentrated pigments specially processed for mixing into concrete and complying with ASTM C979/C979M; “CHROMIX P” (powder) or “CHROMIX L” (liquid) by Sika Corporation, or equal.

1. Color Additive Delivery Method: Manual dispensing using manufacturer’s mix-ready pre-measured containers.
2. Color: As selected by Architect from manufacturer’s standard colors.

2.4 CURING AND SEALING MATERIALS

A. Surface Retarder for Exposed Aggregate Finishes: “Rugasol-S” by Sika Corporation, or equal.

B. Curing and Sealing Compound at Colored Concrete: Clear curing, semi-gloss compound and sealer; “CureSeal-W” by Sika Scofield, or equal.

C. Heavy Duty Color Hardener and Sealer:

1. Color Hardener: Abrasion resistant dry shake colored hardener with integral abrasive additives; “EMERCHROME SC Color Hardener” by Sika Corporation, or equal.
   a. Color: As selected by Architect from manufacturer’s standard colors].
2. Sealer: “LITHOCHROME” Colorwax Concrete Curing Compound” by Sika Corporation, or equal.
   a. Color: To match hardener.

D. Wet Curing Blanket at Interior Slabs: The following, or equal, conforming to ASTM C171.

1. “Transguard 4000” by Reef Industries, Inc., 800-231-6074.
2. “HydraCure M5”” by PNA Construction Technologies, Inc., 800-542-0214.
3. “CONKURE Wet Curing Blanket” by Raven Industries, Engineered Films Division, 800-635-3456.

E. Membrane Curing Compound: ASTM C309, Type 1, clear or transparent that does not discolor finished concrete surface or inhibit proper application or performance of surface finishes, and meets governing VOC limits; Master Builders Solutions “MasterKure” by BASF, or equal.

2.5 ADDITIONAL MATERIALS

A. Waterstops:

1. Hydrophilic Waterstops: Engineered swellable, conformable synthetic waterstop strip expanding in contact with water, resisting hydrostatic pressure and preventing water from entering subgrade structures. “Adcor ES Waterstop Strips” and “Adcor ES Adhesive” by GCP Applied Technologies, or equal.
   a. Waterstop shall maintain cohesive strength after volumetric expansion and during wet-dry cycling.

b. Use with manufacturer's recommended butyl-based adhesive.

2. Flexible Waterstops: Polyvinyl chloride; "Greenstreak PVC Waterstop" by Sika Corporation; or equal.
   a. Profiles and Size: Ribbed center bulb No 626.

B. Concrete Bonding Agent: The following, or equal, conform to ASTM C1059/C1059M.

1. "Weld-Crete" by Larson Products Corporation, 800-633-6668.
2. "Daraweld C" by GCP Applied Technologies, 877-423-6491.

C. Patching Mortar: One-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for horizontal, vertical and overhead applications; "Meadow-Crete GPS" by W.R. Meadows, 800-342-5976; or equal.

D. Non-Shrink Grout: Premixed, non-metallic, no chlorides, non-staining and non-shrinking complying with ASTM C1107/C1107M; "MasterFlow 713" by Master Builders Solutions, a division of BASF, 800-433-9517, or equal.

E. Drainage Rock Base: 3/4-inch aggregate size conforming to Class 2 Aggregate Base as defined in Caltrans Standard Specifications Section 26 or equal clean free-draining gravel or crushed rock as recommended by Geotechnical Engineer.

2.6 CONCRETE MIXES

A. Designed Strength and Classes of Concrete:

1. Class "A" Concrete:
   a. Maximum Aggregate Size: 1-1/2 inch.
   b. Compressive Strength: 3500 psi 28 day with a maximum water to cementitious materials ratio of 0.55.
   c. Air Entrainment at Concrete Not Exposed to Freezing: Average air content not to exceed 3 percent.
   d. Locations of Use: Footings and other similar locations.
   e. Note: Class "B" concrete may be used in lieu of Class "A" at Contractor's option.

2. Class "B" Concrete:
   a. Maximum Aggregate Size: 3/4 inch.
   b. Compressive Strength: 3500 psi 28 day strength with a maximum water to cementitious materials ratio of 0.55.
   c. Air Entrainment at Concrete not Exposed to Freezing: Average air content not to exceed 3 percent.

d. Locations of Use: Interior structural concrete less than 8 inch minimum thickness excluding slabs on grade.

3. Class "C" Concrete:
   a. Maximum Aggregate Size: 3/4 inch.
   b. Compressive Strength: 4000 psi 28 day strength with a maximum water to cementitious materials ratio of 0.45.
   c. Additive at Interior Slabs: Specified moisture barrier admixture added in accordance with manufacturer's written instructions.
   d. Locations of Use: Interior structural concrete less than 8 inches minimum thickness including interior floor slabs and curbs.
   e. Additive at Interior Slabs: Specified moisture barrier admixture added in accordance with manufacturer's written instructions.

B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143/C143M, to meet the following slump values:

1. Class "C": 4 inches plus or minus 1 inch.

C. Mix Design:

1. Concrete shall be designed for strength in accordance with provisions of CBC, Section 1903A.
2. Should the Contractor desire to pump any of the concrete mix designs, a modified mix design will need to be submitted for review.
3. Fly ash may be used in concrete to improve workability in amounts up to 15 percent of cement weight.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify the Following:

1. Requirements for concrete cover over reinforcement.
2. Anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, securely positioned, and will not impede placement of concrete.
3. Slab depressions, slopes for drainage, and other features shown on the Drawings are identified and accommodated.
4. Adjacent finish surfaces are protected during the concrete pour and finishing.
5. Formwork is tight and leak-proof before concrete is poured.
6. Condition of below-grade vapor retarder.

3.2 PREPARATION

A. Remove frost, water, and other foreign materials from form surfaces, reinforcement, and embedded items against which concrete will be placed.

B. When the ambient temperature necessitates the use of cold or hot weather concreting, make provisions in advance of concrete placement.

C. Before placing concrete, clean tools, equipment and remove debris from areas to receive concrete.

D. Clean reinforcing and other embedded items of coatings and soil that may impair bond with concrete.

E. Slab-On-Grade:

1. After subgrade has been approved by Geotechnical Engineer, install specified drainage rock base material to thickness shown.
2. Rock base shall be implemented and consolidated in accordance with the Geotechnical Report and recommendations of the Geotechnical Engineer.
3. Install vapor retarder above drainage rock base below enclosed spaces in accordance with manufacturer's recommendations and as specified in Section 07 2616, Below-Grade Vapor Retarder.

F. Pre-Placement Preparation: Prior to the placing of concrete to replace or repair existing slab on grade concrete:

1. Install clean uniformly-graded 1/2-inch or larger free-draining aggregate to thickness required for matching surrounding subbase level and leaving no voids under the adjacent existing concrete slab.
2. Replace or repair vapor retarder to condition without punctures or gaps, placed directly below and in contact with new concrete slab sections.
3. Apply bonding agent to the exposed edges of the existing concrete slab.

3.3 APPROVAL OF FORMS AND REINFORCEMENTS

A. Forms and reinforcements are subject to approval by the Project Inspector, and notice of readiness to place first pour shall be given to DSA, Architect and Structural Engineer not less than 2 business days prior to placement of concrete.

3.4 APPLICATION OF WATERSTOPS

A. Hydrophilic Waterstop:

1. Concrete surfaces must be clean and free of all contaminants. Remove all debris and loose concrete.

2. On irregular concrete faces, apply a 1⁄2-inch bead of adhesive as a bedding.
3. Secure waterstop strips using masonry nails 1-1⁄2 to 2 inches long with a washer 3⁄4-inch in diameter spaced at a maximum of 12 inch centers with a minimum spacing that ensures proper contact to substrate.
4. Joints in strips shall overlap a minimum of 4 inches with full contact between jointed pieces.
5. Damaged sections should be removed and repaired with new strips prior to pouring concrete.
6. Comply with additional installation instructions of the manufacturer.

B. Flexible Waterstops:

1. Install prior to concrete placement to ensure proper positioning and concrete consolidation around the waterstop.
2. Transitions, intersections, and splices should be heat welded to maintain continuity.
3. Use factory made fabrications for intersections and changes of direction.
4. Transitions, intersections, and splices shall be heat welded in compliance with the manufacturer's Installation guidelines.
5. Comply with additional installation instructions of the manufacturer.

3.5 CONCRETE DELIVERY

A. Mix concrete until there is uniform distribution of material and mass is uniform and homogenous. Mixer must be discharged completely before the mixer is recharged.

B. Concrete shall be Ready-Mix Concrete:

1. Mix and deliver in accordance with the requirements set forth in ASTM C94/C94M and ACI 301.
2. Continuous Batch Plant inspection may be waived in accordance with CBC Section 1705A.3.3, with approval by Structural Engineer of Record, approval by DSA, and the following:
   a. Approved Testing Laboratory shall check the first batching for each class of concrete and furnish mix proportions to the Licensed Weighmaster.
   b. Licensed Weighmaster to identify materials as to quantity and to certify each load by ticket.
   c. Ticket shall be transmitted to Project Inspector by truck driver with load identified thereon. Project Inspector will not accept load without load ticket identifying mix and will keep daily record of pours, identifying each truck, its load and time of receipt and will transmit two copies of record to DSA.
   d. Do not add water at the site to concrete mixes with a maximum specified WCR unless the water content at batch time provides for a WCR less than specified and this provision, including the quantity of water which may be added at the site, is specifically noted on the Mix Design and Certification by the mix preparer.

3.6 PLACING OF CONCRETE

A. General:

1. Place concrete on properly prepared and dewatered sub-grade or forms.
2. Do not begin placing concrete when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing.
3. Do not begin placing concrete during precipitation unless adequate protection is provided. Do not allow rainwater to increase mixing water or to damage the surface of the concrete.
4. Do not place concrete until the Architect approves required Action Submittals.
5. Do not allow mud or foreign materials into the concrete during placement operations.
6. Project Inspector may order removal of equipment used for handling and mixing concrete which is insufficient or in any way unsuitable.

B. Conveying:

1. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients.
2. Deposit as close as practicable in final position to avoid re-handling or flowing. Partially hardened concrete must not be deposited in work.
3. Concrete shall not be wheeled directly over the top of reinforcing steel.

C. Depositing:

1. Once started, continue concrete pour continuously until section is complete between predetermined construction joints.
2. Prevent splashing of concrete onto adjacent forms or reinforcement and remove such accumulation of hardened or partially hardened concrete from forms or reinforcement before work proceeds in that area.
3. Free fall of concrete shall not exceed 4 feet in height. If necessary, provide lower openings in forms to inject concrete and to reduce fall height.
4. Remove form spreaders as placing of concrete progresses.
5. Place footings as monolithic and in one continuous pour.
6. Keep excavations free of standing water.

D. Consolidating: Concrete shall be consolidated by mechanical vibrators.

1. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.
2. Vibrating shall not be applied to concrete which has already begun to initially set nor shall it be continued so long as to cause segregation of materials.

E. Concrete Slabs:

1. Slabs shall be formed and finished to required line and grades.
2. Depress areas of interior floor slabs where required for shower stalls, walk-in refrigerators and freezers, door frames, tile, wheelchair lifts and other equipment and as noted on the Drawings.
3. Slope slab to floor drain where indicated on the Drawings.
4. Tolerances: As specified.

F. Conduit, plumbing lines and other embedment shall not be located in wall panels except where specifically detailed on the Structural Drawings.

3.7 JOINTS

A. Horizontal Construction Joints:

1. Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting.
2. If contact surface becomes contaminated with soil, sawdust or other foreign matter, clean entire surface and re-chip entire surface to assure proper adhesion.
3. Saw Cut Control (Contraction) Joints in Slabs-on Grade: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 1/8-inch thick blade and cut at least 1-inch deep but not less than one quarter (1/4) the depth of the slab unless otherwise indicated on the drawings. Locate control joints a maximum of 30 times the slab thickness in each direction. Limit the ratio of control joint spacing for each direction to 1:1.25.
    a. See layout on the Drawings or, if not shown, as approved by Architect.
    b. Clean dust and debris from saw cut joints.
    c. Unless otherwise noted, joints are to be filled with epoxy joint filler.

B. Saw Cutting:

1. General:
    a. Saw cutting must be performed before concrete begins to cool, within 4 to 12 hours after placing.
    b. Do not make saw cuts if aggregate separates from cement paste during cutting operations.
    c. Prevent marring of surface finish. Fill with flexible sealant.
2. Saw Type: “Mongoose” by Engrave-A-Crete or equal capable of producing the required results.
    a. Blade Type and Speed: Diamond at 11,000 RPM and exceeding normal speed of 9,000 RPM.

b. Blades shall be changed for each Room.

3.8 CONCRETE FINISHING

A. General:

1. Finish slab as required by ACI 302.1R.
2. Use manual screeds, vibrating screeds or roller compacting screeds to place concrete level and smooth. Do not use “jitterbugs” or other special tools designed for the purpose of forcing the course aggregate away from the surface leaving too thick a layer of mortar.
3. While concrete is still wet but sufficiently hardened to bear a person’s weight on knee boards, wood float surface to a true and even plane. Use sufficient pressure to bring moisture to surface and push course aggregate to just below surface.
4. After surface moisture has disappeared, float to true surface and finish utilizing steel trowel. Surface shall be free from trowel marks, depressions, ridges or other blemishes, be acceptable to finish flooring applicators, and meet specified tolerances for flatness and levelness.

3.9 SCHEDULE OF FINISHES

A. Interior Slabs - Smooth Finish:

1. Typical finish to be used at interior slabs to receive applied floor finishes including resilient flooring, wood flooring, and resilient stair coverings.
2. Use also at colored concrete floors and slabs to be left exposed and sealed with heavy duty concrete sealer.

B. Interior Slabs - Medium Broom Finish:

1. Typical finish to be used at interior slab locations to receive ceramic or quarry tile, and other finish materials specified to be installed over substrate with a roughened surface.
2. Use also at locations where slab will be left exposed and will not be colored or sealed, including ramps. At ramps, brooming direction shall run perpendicular to slope to form non-slip surface.

C. Exposed Concrete Surface Finishing Other than Slabs:

1. Remove fins and rough spots immediately following removal of forms from concrete which is to be left exposed.
2. Damaged and irregular surfaces and holes left by form clamps and sleeves shall be patched with grout.

3. Tie wires are to be removed to below exposed surface and holes pointed up with neat cement paste similar to procedure specified for patching under noted under Article “Defective Concrete.”
    a. Removal of tie wires shall extend to distance of 2 inches below established grade lines.
    b. Ends of tie wires shall be cut off flush at all other, unexposed locations.
    c. Care shall be taken to match adjacent finishes of exposed concrete surface.
4. After patching, concrete that is to remain exposed shall be sacked with a grout mixture of 1-part cement, 1-1/2-parts fine sand and sufficient water to produce a consistency of thick paint.
    a. After first wetting the concrete surface, apply mixture with a brush and immediately float entire surface vigorously using a wood float. Keep damp during periods of hot weather.
    b. When set, excess grout shall be scraped from wall with edge of steel trowel, allowed to set for a time, then wiped or rubbed with dry burlap.
5. Entire finishing operation of any area shall be completed on the same day.
6. Treatment shall be carried to 4 inches below grade, and patching and sacking shall be done immediately upon removal of the forms.

D. Curbs:

1. Typical: Smooth steel trowel as specified for slabs.
2. Exposed:
    a. Tool edges after initial floating with an edging tool to a 1/4-inch radius, unless otherwise shown.
    b. Repeat tooling of edges after applying surface finishes.
    c. Eliminate tool marks on concrete surfaces.

3.10 SURFACE TOLERANCES

A. General:

1. Conform to requirements of ACI 302.1R and as specified.
2. Finish troweled slab surfaces to the following specified overall value and minimum local value tolerances for a randomly trafficked floor surface in accordance with ASTM E1155.
3. Designing for nominal increases in concrete slab thicknesses will be required for concrete slabs on metal deck on structural steel framing to achieve compliance as levelness tolerances will require screeding between points set at adjacent columns, rather than providing a constant concrete thickness above steel beams.

B. Typical Slabs-on-Grade and Elevated Slabs:

1. Floor Flatness and Levelness:

a. Floors slabs shall conform to the following ACI F-number requirements when measured in accordance with ASTM E1155:

	Flatness F_F	Levelness F_L
1) Floors Receiving Thinset Tile or Resilient Flooring:		
Specified Overall Value:	35	25
Minimum Local Value:	30	24
2) Polished Concrete Floors:		
Specified Overall Value:	35	25
Minimum Local Value:	30	24
3) Floors Receiving Carpet:		
Specified Overall Value:	25	20
Minimum Local Value:	17	15
4) Noncritical Floors (Utility Rooms, Below Raised Floors):		
Specified Overall Value:	20	15
Minimum Local Value:	15	10

2. Flatness of inclined, cambered or shored, elevated construction after shoring has been removed shall be finished to a straightedge value at any point not to exceed 3/16-inch in 10 feet for typical areas and shall not exceed 1/8-inch in 10 feet for areas to receive thinset tile or resilient flooring.

C. Slabs not listed with an F(F) or F(L) rating shall be true, level and flat with a maximum tolerance of 1/8-inch in 10 feet above or below the grade lines.

D. Sloping slabs shall slope evenly and true from one grade point to the next with the same 1/8-inch in 10 feet requirements.

3.11 CURING

A. Concrete in Forms:

1. Keep forms and top on concrete between forms continuously wet until removal of forms.
2. Maintain exposed concrete in wet condition for 14 days following removal of forms.

B. Do not subject concrete to design loads until concrete is completely cured, and until concrete has attained its full specified 28 day compressive strength or until 21 days after placement, whichever is longer.

C. Interior slabs shall be cured utilizing a wet curing blanket.

1. For slabs utilizing a moisture barrier admixture within the concrete mix, Contractor must confirm with admixture manufacturer that the wet curing blanket may be omitted.

3.12 SURFACE TREATMENTS AND SEALERS

A. General: Apply surface treatments and sealers in accordance with manufacturer's recommendations and written instructions.

B. Application of Color Hardener:

1. Apply color hardener evenly to wet plastic surface by dry-shake method.
   a. Rate: 60 pounds per 100 square feet.
   b. Apply in two shakes.
2. Wood float after each shake, and smooth trowel after final floating until surface is free of trowel marks and uniform in texture and appearance.
3. Protect adjacent paving and planting areas during the coloration process.

C. Application of Surface Retarder:

1. Apply specified surface retarder uniformly to wet concrete after the initial bleed water rises to the surface using low pressure spray equipment in accordance with manufacturer's recommendations.
2. Allow treated concrete to cure at least 12 hours.
3. Remove retarded cement matrix with low-pressurized water or broom to expose aggregate uniformly.
4. Perform cement matrix removal in a continuous operation, utilizing the same work crew to maintain continuity of finish on each surface area of work.
5. Exercise care, and install protective procedures, to prevent rinse water from damaging adjacent materials.
6. Retarder that has not been in contact with the concrete should be neutralized with cement slurry or soda solution before removal.

3.13 WATER REPELLENTS AND GRAFFITI-RESISTANT COATINGS

A. Prepare concrete to receive water repellent in accordance with Section 07 1900, Water Repellents, and graffiti-resistant coating per Section 09 9623, Graffiti-Resistant Coatings, where indicated.

3.14 DEFECTIVE CONCRETE

A. Defective concrete is:

1. Concrete that does not match the approved mix design for the given installation type.
2. Concrete not meeting specified 28-day strength.
3. Concrete which contains rock pockets, voids, spalls, cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.
4. Concrete which is incorrectly formed, out of alignment or not plumb or level.
5. Concrete containing embedded wood or debris.

6. Concrete having large or excessive patched voids which were not completed under Architect's direction.
7. Concrete not containing required embedded items.
8. Concrete finish exhibiting excessive shrinkage, cracking, crazing or curling.

B. Repair or Replacement of Defective Concrete:

1. Requirements for repair or replacement of defective concrete will be determined by Architect.
2. Patching:
   a. No patching is to be done until surfaces have been examined by Architect and permission to begin patching has been provided.
   b. Install specified patching mortar in accordance with manufacturer’s recommendations.
   c. Repairs to defective concrete which affect the strength of structural concrete member or component are subject to approval by the Architect and DSA.
   d. Permission to patch an area shall not be considered waiver of right, by the Owner, to require removal of defective work, if patching does not, in opinion of Architect, satisfactorily restore quality and appearance of surface.
3. Repair damaged and defective work and eliminate functional and visual defects.
   a. Where repair is not possible, cut out and replace defective concrete.
   b. Adjust joints for uniform appearance.
4. Defective concrete shall be removed from the site.

C. In addition to determination of defective conditions by the Architect, the Owner reserves the right to survey the slabs for flatness and levelness to determine if the slabs are outside of the maximum tolerance. If the slabs are found to be out of tolerance, the following will apply:

1. Contractor will be required to bring the slabs to within tolerance by either grinding and filling or replacing the slab.
2. Repair methods proposed by the Contractor must be acceptable to the Owner and Architect.
3. The Contractor will be responsible for reimbursing the Owner for any surveying costs incurred.
4. Determination of slab flatness, surveying and any remedial work must be completed far enough in advance of the scheduled date for installation of the floor finishes so that the project schedule is maintained, delays are avoided and the new slabs or slab repairs are properly cured.

3.15 FIELD QUALITY CONTROL

A. Flatness and Levelness Testing:

1. There will be initial or preliminary inspection of the finished concrete slabs by the Project Inspector and Architect for levelness and flatness.
2. If deemed necessary, Interior slabs on grade, elevated slabs and concrete placement requiring an F(F) and/or F(L) rating by these Specifications or the Drawings may be tested and surveyed in accordance with the requirements of ASTM E1155 by the Owner's independent testing agency. Contractor shall ensure required accessibility for testing to be performed.
3. If it is determined that floors not meeting the flatness criteria is due to means and methods fully within the control of the Contractor, the cost of the survey will be back charged to the Contractor. Failure includes, but is not limited to, the erection of steel and metal deck outside industry tolerances and referenced standards.

B. Concrete Strength Testing: Comply with CBC Sections 1705A.3, 1903A, 1904A, and as specified in this Section. Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. Four identical cylinder 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. In addition, samples for strength tests for each class of concrete shall be taken for seven-day tests at the beginning of the concrete work or whenever the mix or aggregate is changed.
2. Strength tests will be conducted by the Testing Lab on one cylinder at 7 days and two cylinders at 28 days. The fourth remaining cylinder will be available for testing at 56 days if the 28-day cylinder test results do not meet the required design strength.
3. On a given project, if the total volume of concrete is such that the frequency of testing required in Subparagraph 1 above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
4. Cost of retests and coring due to low strength or defective concrete will be paid by the Owner and back-charged to the Contractor.

C. Moisture and PH Testing of Concrete Slab-On-Grade and Above-Grade Concrete, Scheduled to Receive Floor Finish Material: Comply with requirements specified in Section 01 4520, Concrete Floor Moisture Content and PH Testing.

D. Concrete Permeability Testing:

1. Permeability testing must be conducted following ASTM D5084 and/or ASTM ASTM D4263 guidelines after a minimum of 30 days of concrete cure time.
   a. ASTM D5084 Testing: The permeability rate to be no less than 10-7 on the Darcey scale.
   b. ASTM D4263 Testing: If any moisture condensation or observable darkening of concrete color is present at completion of testing procedure, the slab is not ready for a moisture-sensitive floor covering installation.

c. In the event that any section of the cured concrete fails the permeability testing, the Contractor shall apply a topical vapor barrier by the manufacturer of the specified Moisture barrier admixture, to the extent necessary and as approved by the Architect, to mitigate the excess moisture at no additional cost to the Owner.

2. Testing Laboratory Requirements: The Contractor or its Subcontractors may not conduct testing for concrete slab permeability. These tests shall be provided by the Contractor through an independent third party testing laboratory.

3. Provide access for and cooperate with the approved independent third-party testing lab.

4. Following testing, the test results must be submitted to the Contractor, Architect, Owner, and flooring installer a minimum of 10 business days prior to scheduled installation date of flooring. Installation of flooring at tested areas may not begin without Architect's review and approval of the testing results.

END OF SECTION

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Last Updated: November 10, 2021

SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members.
   1. Galvanized, prime and paint, at exterior exposed structural steel.
   2. Shop-primed at concealed and at painted steel.

1.02 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. AISC - American Institute of Steel Construction:
   1. AISC Manual - AISC Manual of Steel Construction (AISC 325), 16th Edition.
   2. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
   3. AISC 360 - Specification for Structural Steel Buildings.
   4. AISC 341 - Seismic Provisions for Structural Steel Buildings including Supplement No. 1.

C. ASTM International:
   1. ASTM A36 - Structural Steel
   2. ASTM A53 - Steel Pipe, Black and Hot-Dip Zinc-Coated, Welded and Seamless
   3. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
   4. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products
   5. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware
   6. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners
   7. ASTM A325 - High Strength Bolts for Structural Steel Joints
   8. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
   9. ASTM A500 - Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
   10. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
   11. ASTM A572 - Grade 50 - Structural Steel
   12. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
   13. ASTM A992 - Steel for Structural Shapes for Use in Building Framing
   14. ASTM C1107 - Packaged Dry, Hydraulic Cement Grout (Non-Shrink)
   15. ASTM F1554 - Standard Specification for Anchor Bolts.
   16. ASTM F1554 - Standard Specifications for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

D. ASCE/SEI 7 - American Society of Civil Engineers, Structural Engineers Institute, ASCE Standard.

E. AWS - American Welding Society:
   1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non-Destructive Examination.
   2. AWS A5.1 - Carbon Steel Electrodes for Shielded Metal Arc-Welding.
   3. AWS A5.5 - Low Alloy Steel Electrodes for Shielded Metal Arc-Welding.
   4. AWS B2.1 - Welding Procedure and Performance Qualification.
   5. AWS D1.1 - Structural Welding Code, Steel.
   6. AWS D1.2 - Structural Welding Code, Aluminum.
   7. AWS D1.3 - Structural Welding Code, Sheet Steel.
   8. AWS D1.6 - Structural Welding Code, Stainless Steel.
   9. AWS D1.8 - Structural Welding Code, Seismic Supplement.

F. SSPC - Steel Structures Painting Council.

G. CBC - California Building Code 2022, Chapter 22A.

1.03 SUBMITTALS

A. Shop Drawings:
   1. Indicate profiles, sizes, spacing and locations of structural members, connections, openings, attachments and fasteners.
   2. Indicate cambers.
   3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

B. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

C. Mill Test Reports: showing structural strength, destructive and non-destructive test analysis and identification.

D. All certified welders employed on the work have been AWS qualified within the previous 12 months, in accordance with AWS-WHB-1.

E. Fabricator's and erector's qualifications and certifications.

F. Submit written welding procedures to Owner's testing agency for all welding on project. Procedures shall be in accordance with AWS pre-qualified welds. For welds not pre-qualified by AWS, provide project-specific procedures qualified by testing in accordance with AWS D1.1 to match actual materials, conditions, and orientations.

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

1.04 QUALITY ASSURANCE

A. Qualifications:
   1. Fabricator: Company specializing in performing structural steel work minimum five years' experience. Qualified fabricator who participates in the AISC Quality Certification Program and its designation as AISC-Certified Plant, Category Sbd Conventional steel building structures or Category Cbd for complex steel building structures.
   2. Erector: Company specializing in performing structural steel work with minimum five years' experience.
   3. Erector: AISC Certified Erectors for Category CSE-Certified Steel Erector for steel and erection required.
   4. City of Los Angeles Department of Building and Safety certification (license) for the steel Fabricator and Erector is acceptable in lieu of certification by AISC.
   5. AWS Certified welders.
   6. DSA-Projects: All welding shall be specially inspected by an AWS-CWI Qualified Inspector.

B. Fabricate structural steel members and perform work in accordance with AISC-M015L.

C. Perform welding in accordance with AWS D1.1 and California Building Code Section 2204A.1.

D. Galvanized Structural Steel Coating applicator: Company specializing in hot-dip galvanizing after fabrication and following the procedures in the *Quality Assurance Manual* of the American Galvanizers Association.

1.05 FIELD MEASUREMENTS

A. Verify field measurements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel Members: W-Shape Sections use ASTM A992 [or ASTM A572 Grade 50 ksi steel], as indicated on Structural Drawings.

B. Channels, Angles, Plates, Bars, M-Shapes and S-Shapes: ASTM A36.

C. Structural Tubing: Hollow Structural Sections (HSS), ASTM A500, Grade B, minimum yield strength, 42 ksi.

D. Pipe: ASTM A53, Type E or S, Grade B, Schedule 40.

E. Bolts, Nuts and Washers: ASTM A307 galvanized to ASTM A153 for galvanized members, American National Course Threaded Series.

F. Anchor Bolts, Pins and Rods: ASTM F1554.

G. Anchor Bolts High Strength: ASTM A354 Grade BC anchor bolts, zinc coated, at exterior exposed locations.

H. High Strength Bolts: ASTM A325 Slip-Critical, tension set high strength bolts, by Bristol Machine Co., Walnut, CA, or equal as approved in accordance with Division 01 for substitutions.

I. Welding Materials: AWS A5.1, E70XX, type and procedures required by electrode manufacturer for materials being welded.

J. Non-Shrink Grout: ASTM C1107, high performance, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; of consistency suitable for application and a 30 minute working time.

K. In-Shop Primer: Series L69 Hi Build Epoxoline II, Red color Low VOC epoxy, air dried, by Tnemec or equal. [Manufacturer's standard primer for unpainted steel permanently enclosed in walls and above finished ceilings.]

L. Touch-Up Material for Galvanized Steel: ASTM D520 Type III High Purity Grade zinc dust, ready mixed, zinc-rich galvanizing compound 95% metallic zinc. Galvilite by ZRC Wordwide, Marshfield, MA or equal.

1. 3/16-inch for more than 5/8-inch diameter.

2.02 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP-3 Power Tool Cleaning for embedded steel. Apply primer by brush or spray, minimum dry film thickness 3.0 mils.

B. Shop prime structural steel members. DO NOT prime surfaces that will be fireproofed, field welded, in contact with concrete or high strength bolted.
1. Clean surfaces to be primed, remove mill scale, grease, dirt and foreign matter. Two coats required for parts in contact but inaccessible for painting after erection.
2. Apply primer by brush or spray, minimum dry film thickness 3.0 mils. Thoroughly work into joints, angles and open spaces. Allow primer to dry and harden prior to handling for delivery to the site.
3. Clean contact surfaces immediately prior to assembly, leave unpainted.
4. Coat machined surfaces with approved removable coating to prevent corrosion.
5. After erection, clean field welds, field bolts and abraded portions and apply one additional brush spot coat using same paint material.

6. All surfaces scheduled to receive sprayed-applied fireproofing shall be free of lubricants, oils, paint or other matter that will impair adhesion of fireproofing.

C. Galvanize exposed exterior structural steel members where indicated to minimum Coating Grade 80 (1.9 oz/sq. ft.) in accordance with ASTM A123.

D. Galvanized items to be painted: Do not use quenching solutions or treatments immediately after galvanizing. Refer to individual sections for galvanized items to be painted.

D. All exterior steel exposed to weather conditions shall be shop galvanized and primed painted.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.
1. Report discrepancies between drawings and field dimensions to Architect before commencing work.

B. Beginning of installation means erector accepts existing conditions and surfaces underlying or adjacent to work of this section.

3.02 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

B. Camber structural steel members where indicated.

C. Identify high-strength structural steel according to ASTM A6 and maintain markings until steel has been erected.

D. Mark and match-mark materials for field assembly.

E. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.

F. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.

G. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

3.03 ERECTION

A. Allow for erection loads and stresses, and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing. Provide bracing for dead and live loads and wind loads. Keep bracing in place until required to maintain safe conditions.

B. Contractor shall be responsible for correcting detailing and fabrication errors and for correct fitting of all members and components.

C. Field weld components and shear studs indicated on structural drawings.

D. Do not field cut or alter structural members without approval of Architect.

E. When approved, perform cutting, punching, drilling and tapping to accommodate work. Obtain accurate data as indicated on shop and erection drawings.

F. After erection, prime welds, abrasions and surfaces not shop primed except surfaces to be in contact with concrete.

G. Grout under base plates with the specified non-shrink grout.

H. Provide anchor bolts with templates and diagrams. Contractor shall be responsible for proper location and installation of bolts. Correct deficiencies or errors.

3.04 ERECTION TOLERANCES

A. Conform to AISC 303 Code of Standard Practice for Steel Buildings and Bridges.

3.05 HIGH STRENGTH BOLTS

A. Allowable hole sizes: 1/16 inch larger than bolt size.

B. Use friction type connection with standard hardened steel circular, square or rectangular washer under bolt nut.

C. Thoroughly clean area under bolt head, nut and washer. Remove all paint, lacquer, oil or other coatings except organic zinc-rich paints in accordance with SSPC, SP-2.

D. Tighten bolts by power torque wrench or hand wrench until twist-off.

3.06 PUNCHING AND DRILLING

A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.

B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.

C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts by reaming, flame cutting to enlarge holes is not acceptable. Poorly matched holes will be rejected.

D. Punch and ream holes to receive high strength bolts.

3.07 WELDING

A. Conform to AWS D1.1 and CBC Chapter 22A, Section 2204A.1.

B. Perform welding by direct electric arc process. Use operators certified within preceding 12-month period as per AWS "Standard Qualification Procedure."

C. Chip welds to remove slag. Use wire brush to demonstrate uniformity of section, smoothness of welded metal, freedom from undercuts, overlays or feather edges and freedom from porosity and clinkers.

D. Visually inspect edges and ends of fillets and butt joint welds for indication of good fusion and penetration into base metal. Grind smooth all exposed welds.

E. Use of cutting torch will be allowed where metal being cut does not carry stress during the operations and provided no stresses will be transmitted through a flame-cut surface. Make gas cuts smooth and regular in contour.

F. To determine effective width of members subjected to gas cutting, deduct 1/8 inch from width of gas cut edges. Make radius of gas cut fillets as large as practicable, but in no case less than one inch. Gas cutting to align bolt is not permitted.

3.08 CLEANING AND STRAIGHTENING

A. Before fabrication, thoroughly wire-brush material clean of scale and rust. Straighten by methods that will not injure materials.

B. After punching or working, remove twists or bends before parts are assembled. Make finished members free from twists, bends and open joints when erected.

C. Touch-Up Material for Galvanized Steel: Ready mixed, zinc-rich galvanizing compound, ASTM A780 - A2. Repair Using Paints Containing Zinc Dust, minimum thickness 5 mils.

D. Repair galvanized surfaces, where bare metal is exposed at weld sites and where shop finish is abraded or otherwise damaged, Use hot or cold repair process at contractor's option, build-up zinc coating to minimum 5-mil thickness.

1. Cold Repair Process: ASTM A 780, A2 using ready mixed, fluid applied galvanizing repair compound.
2. Hot Repair Process: ASTM A 780, A1 using zinc-based alloys. Apply zinc solder while metal is still hot. Tin surface with zinc alloy and wire brush. Do not direct flame on alloy.

3.09 FITTING

A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.

B. Drilling to enlarge unfair holes will not be allowed. Light drifting to draw parts together will be permitted. Do not heat rolled sections, except for minor details.

3.10 QUALITY CONTROL

A. Required testing shall be performed under provisions of Division 01, General Requirements and California Building Code Section 2205A.

B. All complete penetration welds shall be subject to Ultrasonic Testing, as per AWS D1.1. All defective welds shall be repaired and retested with ultrasonic equipment at the Contractor's expense.

3.11 HANDLING

A. Both in shop and in field, transport, handle and erect to preclude damage or overstressing of any component.

3.12 FINISH

A. Paint exposed steel.

END OF SECTION

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 3543, Environmental Procedures.

C. Section 01 8113, Sustainable Design Requirements.

D. Section 05 5000, Metal Fabrications.

E. Section 06 1700, Shop-Fabricated Structural Wood.

F. Section 06 2000, Finish Carpentry.

1.3 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. Special Inspection of the fabrication of engineered wood products is required per CBC 1705A.5 unless fabricator is registered and approved by the California Division of State Architect

1.4 SUBMITTALS

A. Refer to Section 01 3300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. CAL-GREEN Submittals:

1. Product Data – VOC Limits: For adhesives, sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified in Section 01 6116.
2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

D. Provide mill certificates for D.F. pressure treated materials.

E. Machine Nailing: Submit technical data for gain and nails to be used, along with sample nails.

1.5 GUARANTEE

A. Refer to General Conditions and Section 01 3300.

1.6 REFERENCES AND STANDARDS

A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).

B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).

C. ANSI/AF & PA National Design Specification for Wood Construction.

D. ANSI/AF & PA Special Design Provisions for Wind and Seismic.

E. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).

F. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17, September 1991, rev. January 2004; West Coast Lumber Inspection Bureau.

G. WWPA G-5 - Western Lumber Grading Rules, October 2004; Western Wood Products Association.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

1.9 PROJECT RECORD DOCUMENTS

A. Provide per Section 01 7700, Closeout Procedures.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.

B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements.

C. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

2.2 MATERIALS

A. Lumber: Douglas Fir-Larch unless otherwise noted. Lumber designated as Douglas Fir South by WWPA is not acceptable. All lumber shall be graded under the American Softwood Lumber Standard DOC PS 20-05 and one of the following:

1. Standard Grading Rules No 17, West Coast Lumber Inspection Bureau (WCLIB) or Western Lumber Grading Rules, Western Wood Products Association (WWPA).

B. All lumber shall be new with no re-use except as permitted by Architect. Lumber 3x or thicker will be free of heart center without any pith enclosed within the piece or showing on any surface. Maximum moisture content 19%.

1. Lumber Grades: All lumber grades and plywood shall comply with the following minimum requirements for species and grades unless specifically noted otherwise on the Drawings. (See also 2.02C.)

a. General: Douglas Fir Larch as follows:
   1) 2x4 No. 1 Vis. Graded or 1650f, 1.6E M.S.R.
   2) 2x6 No. 1 Vis. Graded or 2100f, 1.8E M.S.R.
   3) 2x8-2x14 No. 1 Vis. Graded or 2100f, 1.8E M.S.R.
   4) 3x4-3x14 No. 1 Vis. Graded
   5) 4x4-4x10 No. 1 and Better Vis. Graded
   6) 4x12-4x16 Select Structural Vis. Graded
   7) 6x6-larger Select Structural Vis. Graded

2. Sills: Douglas Fir No. 2 or better; pressure treated with approved preservative to obtain minimum penetration of 1/4" into all surfaces of wood, marked or branded by an American Lumber Standards Committee (ALSC) approved inspection agency. Foundation grade Redwood sills may be used only for non-structural stud walls or where specifically shown on the Drawings.
3. Blocking, bridging, furring, stripping and nailers - No. 2.
4. Plywood Sheathing: Structural I C-D, interior plywood bonded with exterior glue (DOC PS 1), T & G Edges where shown.
5. Sills, Stripping at Roof and Hip and Ridge Nailers for Steel Tile: DF pressure treated with approved preservative to obtain minimum penetration of ¼" into all surfaces of wood (Mill certificate for this treatment must be furnished with shipment). Redwood sill may be used only for non-bearing stud walls or where shown explicitly on Structural Drawings.
6. Exterior structural framing (exposed to weather) shall be redwood select structural grade, pressure treated D.F. No. 1, or Alaskan Yellow Cedar.

C. Wood Preservative:

1. General: Per American Wood Preservers' Association (AWPA) Standards; all pressure treated wood shall be marked or branded to indicate the treatment is as specified. Treated lumber shall be handled on site per AWPA standard M4.
2. Exposed Wood : Where pressure treated wood is exposed so that it may come in contact with people, (as for example, playground and recreational equipment, handrails, outdoor benches and tables, walking decks and other portions of exterior walkways, poles and posts, trellises and the like) the use of pentachlorophenol and creosote is prohibited as the preservative. For these exposures, limit the use of preservatives containing arsenic or derivatives thereof to Ammoniacal Copper Arsenate (ACA) or Ammoniacal Copper Zinc Arsenate (ACZA) treated in accordance with Standard U1 of the American Wood Preservers' Association provided that as originally installed the wood is sealed with a nontoxic and non-slippery sealer.
3. Concealed Wood: Where pressure treated wood is prevented from coming into contact with people in its normal service by reason of its finishes; (as for example, sill plates covered by sheathing and/or plaster or wallboard) the preservative may

be ACA, ACZA, or Pentachlorophenol in approved method; all in accordance with Standard U1 of the American Wood Preservers' Association.

4. Paint-on Application: Treatment specified for certain items of work where pressure treatment has been damaged by field cuts or bored holes: Copper Naphthenate in penetrating oil similar and equal to Green's Products Co., "Copper-Green".

D. Fastenings:

1. Nails: ASTM F1667; common steel wire; use galvanized nails for exterior work, excluding pressure-treated materials. When nailing into pressure-treated materials (exterior or interior work), nails shall be hot-dipped galvanized in accordance with ASTM A153, Class D. For other exterior work not requiring nailing into pressure-treated materials, galvanized zinc coating can be in accordance with ASTM A153, Class D, or ASTM B695, Class 55. Box and sinker nails are not permitted. Ring shank (or accepted equal) nails must be used for plywood floors and for all ceiling stripping.
2. Bolts: Machine bolts, unless noted otherwise (ASTM A-307, Grade A). Rolled-body bolts with upset threads not permitted.
3. Lag Screws: ANSI Standard B18.2.1
4. Wood Screws: ANSI Standard B18.6.1; use galvanized type for exterior work
5. Washers: Use for all bolts or lag screws bearing on wood. Malleable iron or steel washer at head and nut as shown on Drawings. Washers not required under heads of carriage bolt, but nut shall have cut washers.
6. Drilled-in Concrete Anchors: Hilti "Kwik Bolt TZ2" (ICC Report No. ESR-4266) or accepted equal; stainless steel for all exterior work; testing required.
7. Drilled-in Masonry Anchors: Hilti "Kwik Bolt TZ2" (ICC Report No. ESR-4561) or accepted equal; stainless steel for all exterior work; testing required.
8. Epoxy Anchors:
    a. General: Anchor rods shall be furnished with a 45-degree chisel point on one end to allow for easy insertion into adhesive filled hole and manufactured to meet the requirements of ASTM A36. Nuts and washers shall be furnished to meet the requirements of the anchor rod specifications noted above. Install per manufacturer's recommendation; use stainless steel for all exterior work; testing required per CBC 1910A.5.
        1) Acceptable Products:
            a) Concrete: Hilti "HIT-HY 200" (ICC ESR-3187) or accepted equal.

E. Rough Hardware:

1. Hangers, Clamps, Straps and Anchors:
    a. General: Steel or iron of standard type and manufacture.
    b. Special Fabrications: Provided under Section 05 5000 – Metal Fabrications.

c. Light Gage Metal Connectors: Use maximum number of fasteners in each connection unless otherwise noted.

2. Acceptable Manufacturer: Simpson Strong-Tie Co.

3. Acceptable Alternatives: Due to the quantity and specific detailing of hardware, it is a requirement “Simpson Strong-Tie Co.” products be used in the “base bid”. Alternative products will be considered for approval as an alternate bid provided specific hardware is compatible with connection and other components of the structural system, and allowable load capacities exceed or meet the criteria of the specified product. Use of alternate products will require side-by-side documented comparison and change order submitted by Contractor, to be reviewed by Structural Engineer and DSA. The review and approval of a substitution will be paid by the Owner and deducted from contract price.

4. Light Gage Metal Straps: ASTM A653 with yield strength 33 ksi, ultimate of 45 ksi.

F. Building Paper: Pabco, J.M., or accepted equal; #15 asphalt saturated felt.

G. Non-shrink Grout: Embeco, Ferrolith G.D.S, or accepted equal; pre-mixed, non-shrinking and non-staining.

H. Joint Sealants: Furnished and installed under this Section. (Materials and workmanship shall conform to Section 07 9200.)

2.3 QUALITY CONTROL

A. Lumber:

1. Grade mark each piece of lumber by agency approved by DSA. Lumber Manufacturer's Association Certificates may be accepted in lieu of such grade and trade marks for complete, unbroken original bundles readily identifiable to certificate, only. Certificates will be required for items used structurally but furnished under Millwork Section.

2. Moisture Content: Lumber shall have maximum moisture content of 19% at the time of installation. All lumber must be at the specified 19% maximum moisture content prior to being encased by insulation, gypboard, or other surrounding architectural materials. The Contractor shall take all measures necessary to provide lumber meeting these criteria. No schedule delays will be permitted to meet moisture content requirements.

3. Wane: Wane is not allowed on the face of members at plywood edge joints. Wane is further prohibited within the bearing area of supporting connectors, or within connections where it will reduce the strength of the connection. The Contractor shall monitor the use of wane material for conformance with these requirements and cull out any non-conforming material for use as blocking.

B. Plywood Sheathing: Each panel shall be legibly identified as to type, grade and species glue per American Plywood Association specification.

2.4 EQUIPMENT

A. Powder Actuated Fasteners: Hilti, Ramset, or accepted equal.

1. General: Powder-actuated fastening systems may be used where shown, specified, or elsewhere required, except in structural connections required to carry computed stresses. All connectors and powder charges shall be used in strict accordance with manufacturer's instructions, and shall only be used by certified operators.
2. Application: Methods shall be in accordance with Article 28, Powder-Actuated Tools, Paragraph 1685, of Title 8, California Code of Regulations.
3. Holding Power: Demonstration of satisfactory and secure fastenings made at site under actual job conditions will be required before proceeding with work. Evidence of inadequate holding power will be cause for rejection of such fastening

PART 3 - EXECUTION

3.1 ERECTION AND BRACING

A. Furnish and erect rough structural wood framework, including posts, beams, rafters, studs, plates, nailers, blocking, bridging, sheathing, stripping, purlins, grounds and furring.

B. Furnish all plant, labor, material, tackle, guys, braces, scaffolds, staying and equipment necessary to erect rough carpentry components and to hold them safely in position until permanent connections are completed. Permanent connections as used herein refer to all hardware and include all structural work of any description and attachment thereof to the surrounding walls.

C. Wherever stacks of material, erection equipment or other loads are carried by work during construction, make provisions to take care of stresses and strains resulting. Keep temporary bracing in place until permanent walls and roofs are completed; provide temporary bracing sufficient to keep structure stable, plumb and in line until completed. Place temporary bracing to allow freedom of workmen in building and erecting other work.

3.2 FRAMING

A. General:

1. Layout: Work as indicated on the Drawings. Set nailing blocks, anchors, bolts, grounds, plates, backing, etc., required; establish lines, levels, and locations for work specified under other sections, and see that all work is coordinated. Do all cutting, patching, and fitting to accommodate work specified under other sections.
2. Lumber: Individual pieces of lumber for use in parts of work shall be selected in such manner that knots and obvious minor defects will not interfere with placing of

bolts, proper nailing, or making good connections. Lumber shall be cut to length on job site after verification of compliances with Article 2.2A by Project Inspector and Contractor. Off-site cutting will not be allowed except as established by approved Change Order.

3. Framing for Piping: Frame partitions containing any piping to give proper clearance; place pipe 1½" outside diameter or less in center of plate using neat round holes; no notching allowed; pipes not to pass through sills or plate less than 5½" in width. Furr partitions where required to conceal piping.
4. Fire Blocking: Provide 2" nominal thickness lumber for blocking by width of enclosed spaces within partition; provide fire blocks at intersection of interior and exterior walls with ceilings and roof to effectively cut all communication by fire through hollow concealed space, and prevent vertical and horizontal draft. Use continuous row of fire furring; place in such manner that no concealed air spaces greater than 10' in any direction occur. Fire blocking and draft stops shall be provided in conformance with CBC Section 708.4.2.
5. Lath and Plaster: Provide studs and solid blocking as required for complete installation of lath and accessories specified in Section 09 2423, Portland Cement Plastering.
6. Shop-Fabricated Structural Wood: Provided under Section 06 1700. Do not erect any for which inspection certification has not been provided.
7. Recessed Fixtures: Frame openings for panel boxes and other equipment, according to requirements of fixtures provided.
8. Roof Strips, Roof Curbs and Nailers: Install at openings through roof, except where prefabricated curbs are shown or specified.
9. Plywood Sheathing: See Drawings for thickness. All joints of wall sheathing must bear on studs or blocking. All plywood nailing shall be as shown on Structural Drawings. Closer nail spacing applies not only at all edges of all sheets, but also over all walls or beams, and farthest nail spacing applies only at interior bearings other than as specified above.
10. Use of nailing gun to apply nails is subject to a satisfactory jobsite demonstration for each project and the written approval of the project Architect or Structural Engineer and the enforcement agency. Such approval will be qualified to insure results being equal to that obtained with hand nailing and subject to continued satisfactory performance. Where electrical or mechanical requirements require interruption of plywood pattern, same must be submitted to and approved by Structural Engineer through Architect. If the nail heads penetrate the outer ply more than would be normal for a hand-held hammer, or if minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory and machine nailing shall be discontinued.
11. Nailing: Penetration of nails or spikes not shown otherwise half-length of nails into piece of receiving points; however, to connect pieces 2" net in thickness, 16d nails may be used unless shown otherwise. Do not drive nails closer together than half their length nor closer to edge of piece of lumber or timber than ¼ of their length; opening and size of nails to be such that splitting will not occur; bore holes for nails

wherever necessary to prevent splitting; bore diameter of hole smaller than diameter of nail spike; see Nailing Notes on Drawings. Wherever nails of normal length may penetrate and show in exposed work, use nail of specified diameter and shorter length.

12. Screws: Driving into place not permitted. Soap may be used to lubricate screws. In placing lag screws and wood screws #14 and larger, first bore holes of same diameter and depth as shank; bore holes for threaded portion of screws with bit 70% shank diameter.
13. Steel Plates and Shapes Bolted to Wood: Bore holes in timber same diameter as bolt; use steel piece as templates for locations of holes; tighten nut or rods and bolt at time of installation and re-tighten before covering up just before final acceptance of the work; examine accessible nut, re-tighten any to be found loose. For exposed work, cut protruding bolt ends off within ½ “inch of bolt head and file all burrs off.
14. Gypsum Sheathing: Apply horizontally and fasten by nailing in accordance with CBC Table No. 2508.1.
15. Rough and Framing Hardware: Furnish and install all rough hardware such as, nails, spikes, bolts, screws, drift pins and dowels. Furnish and install all framing clips, hangers, splice plates and other framing hardware. Furnish anchor bolts for installation.

B. Roof Framing:

1. Beams and Girders: Install with crown edge up. Provide full bearing at ends of each member as shown. Splices not permitted except over columns.
2. Joist Framing: Install with crown edges up and support ends of each member minimum of 1-1/2” of bearing on wall framing. Anchor joists and provide blocking for all plywood joints and as shown.
3. Rafter Framing: Notch to fit exterior wall plates. Double at openings in roof. Bevel ends of rafters at ridge and hip rafters. Place rafters directly opposite each other at ridge. Provide solid blocking for all plywood joints.
4. Plywood Roof sheathing: Install plywood with face grain perpendicular to supports, using panel with continuous end joints over two or more spans staggered between panels and located over supports. Where drawings call for a panelized framing system; install plywood with face grain parallel to framing; panels staggered. Allow minimum space 1/16” between end joints and at edge joints for expansion and contraction of panels. Stagger panels at end joists.

3.3 MISCELLANEOUS INSTALLATION

A. After installation of metal items specified in Section 05 5000 touch up abrasions or voids in shop prime coat, using same material specified for priming.

B. Provide curbs and bolting for mechanical equipment as shown on Mechanical Drawings.

C. Provide vent holes as shown on Drawings.

D. At sound-deadened partitions install sill plates on double bead of non-skinning type, butyl-based caulking compound.

E. For items involving more than one section of these Specifications, coordinate work of all trades and be responsible for installation of item.

F. Install railing, using specified non-shrink grout in accord with manufacturers printed instructions.

G. Caulking: (See Section 07 9200 for locations where joint sealants will be applied.) At other locations, and wherever required, apply specified material neatly and in accord with manufacturer's written instructions. Apply with sufficient pressure to completely fill joints. Clean surrounding material of excess caulking.

H. Building Paper: Install on wall surfaces where finish will be metal siding or veneer. Apply 2 layers weatherboard fashion with 2" laps to horizontal joints and 6" laps at vertical joints and corners. Use 3/8" head galvanized nails, nailing sufficiently to hold without buckling. Repair all damaged places before installation of finish materials. Installation of backing paper for lath and plaster is included in Section 09 2423.

3.4 DEFECTIVE WORK

A. Replace all defective work at Contractor's expense.

B. Replace defective or damaged work with conforming work.

C. Correct defects using means that will not injure the materials.

D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.

E. Repair or replace framing lumber sagged, twisted or warped due to shrinkage from excessive moisture content at time of installation, or from other causes.

F. Adjust to meet specified tolerances.

G. Architect/Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.

H. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining approvals of DSA necessitated by incomplete, improperly performed, defective or nonconforming work.

I. Contractor shall pay expenses due to re-testing and re-inspection necessitated by incomplete, improperly performed, defective or nonconforming work.

- END OF SECTION -

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Last Updated: January 12, 2018

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Framing with dimension lumber.
   2. Plywood backing panels.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for composite wood products, indicating compliance with emissions testing or certification.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Composite Wood Products:
      a. Formaldehyde emissions testing or certification.

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2.02 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.03 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
   2. Wood floor plates that are installed over concrete slabs-on-grade.

2.04 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any of the following species:
   1. Hem-fir (north); NLGA.
   2. Hem-fir; WCLIB or WWPA.
   3. Western woods; WCLIB or WWPA.

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2.05 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.06 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
   1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

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1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated.

H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.02 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

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SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Plastic-laminate-clad cabinets.
   2. Cabinet hardware and accessories.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.
   2. Section 12 36 00 "Countertops" for countertops.

1.02 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For architectural cabinets.
   1. Include plans, elevations, sections, and attachment details.
   2. Show large-scale details.
   3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
   5. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Verification: For the following:
   1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
      a. Provide one sample applied to core material with specified edge material applied to one edge.
   2. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.04 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:

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1. Documentation for composite wood products, indicating compliance with emissions testing or certification.

B. Qualification Data: For Installer.

C. Field Quality-Control Reports: From field quality control inspections.

1.05 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.06 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with WI's North American Architectural Woodwork Standards (NAAWS) for grades indicated for construction, finishes, installation, and other requirements.
1. Where the Contract Documents contain requirements that are more stringent than the referenced quality standard, comply with requirements of the Contract Documents in addition to those of the referenced quality standard.

B. Manufacturer's Qualifications: 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.
1. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.

C. Installer Qualifications: Licensed participant in WI's Certified Compliance Program.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.08 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where cabinets 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.

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1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Composite Wood Products:
      a. Formaldehyde emissions testing or certification.

2.02 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A. Architectural Woodwork Standards Grade: Custom.

B. Type of Construction: As indicated on drawings.

C. Door and Drawer-Front Style: As indicated on drawings.
   1. Reveal Dimension: As indicated on drawings.

D. High-Pressure Decorative Laminate: ISO 4586-3, grades as indicated or if not indicated, as required by quality standard.

E. Exposed Surfaces:
   1. Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.

F. Materials for Semiexposed Surfaces:
   1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate.
      a. Edges of Plastic-Laminate Shelves: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
   2. Drawer Sides and Backs: Solid-hardwood lumber.
   3. Drawer Bottoms: Hardwood plywood.

G. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
   1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

H. 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 on drawings.

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2.03 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
   1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
   2. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
   1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.

2.04 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 71 00 "Door Hardware."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, nominal 170 degrees of opening, self-closing with integral sound damping.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Blum; CLIP Top Series.

C. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Hafele.

D. Adjustable Shelf Brackets: BHMA A156.9, B04071; Aluminum mortise-mount pilaster and steel support clip shelving system with 1/2 inch vertical slot adjustability.
   1. Basis-of-Design Product: Knape & Vogt 255/256R Aluminum Series.
   2. Finish: As selected by Architect from manufacturer's full range.
   3. Installation Method: Pilaster supports mortised flush into cabinet and shelving walls.

E. Drawer Slides: BHMA A156.9, and as follows:
   1. General Purpose Drawer Slides: Full extension and 1.5" extension, ball bearing captured slides.
      a. Basis-of-Design Product: Knape and Vogt.

F. Door Locks: ANSI/BHMA A156.11, E07121.
   1. Basis-of-Design Product: Sugatsune Model 6830-30MK.
   2. All cabinets in each Room to be keyed alike.

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3. All Rooms to be keyed different.

G. Drawer Locks: ANSI/BHMA A156.11, E07041.
1. Basis-of-Design Product: Sugatsune Model 6830-30MK.
2. All cabinets in each Room to be keyed alike.
3. All Rooms to be keyed different.

H. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated and as follows:

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.05 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.06 FABRICATION

A. 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 architectural cabinet fabrication will be complete.
2. Trial fit assemblies at manufacturer's 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.

B. 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.

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PART 3 - EXECUTION

3.01 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.02 INSTALLATION

A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates.
   1. Secure plastic-laminate-clad cabinets with wafer-head cabinet installation screws.
   2. Secure wood cabinets with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with cabinet surface.
   3. For shop-finished items, use filler matching finish of items being installed.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
   1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
   2. Install cabinets without distortion so doors and drawers fit openings 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.
   3. Comply with requirements for seismic installation in accordance with Architectural Woodwork Standards and Drawings.

3.03 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through WI's Certified Compliance Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
   1. Inspection entity shall prepare and submit report of inspection.

3.04 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

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B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION

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SECTION 06 64 00 - PLASTIC PANELING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Plastic sheet paneling.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.
   2. Section 10 26 00 "Wall and Door Protection" for corner guards installed over plastic paneling.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives and sealants, indicating VOC content.

1.04 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

2.01 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. Nudo Products, Inc.

B. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

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2.02 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:
      a. VOC content limits for field applications.
   2. Sealants:
      a. VOC content limits for field applications.

2.03 PLASTIC SHEET PANELING

A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319.
   1. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   2. Nominal Thickness: Not less than 0.09 inch.
   3. Surface Finish: As selected by Architect from manufacturer's full range.
   4. Color: As selected by Architect from manufacturer's full range.

2.04 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, and caps as needed to conceal edges.
   1. Color: As selected by Architect from manufacturer's full range.

B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

D. Adhesive: As recommended by plastic paneling manufacturer.

E. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

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PART 3 - EXECUTION

3.01 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.

3.02 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

E. Lay out paneling before installing. Locate panel joints where indicated.

3.03 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install trim accessories with adhesive.

C. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

D. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

E. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.

F. 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

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SECTION 07 42 13.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Concealed-fastener, lap-seam metal wall panels.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:
   1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
   2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
   1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

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C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.06 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.07 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Forty years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Finish Warranty Period: 40 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

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1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.02 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Integral Batten Joint, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and a integral batten profile between panel edges.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Metal Exteriors; Signature Series Metal Batten Siding System or comparable product by one of the following:
      a. CENTRIA, a Nucor Brand.
      b. MBCI; Cornerstone Building Brands.
      c. Metal Sales Manufacturing Corporation.
      d. Morin - A Kingspan Group Company.
   2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
      a. Nominal Thickness: 26 gauge.
      b. Exterior Finish: Two-coat fluoropolymer .
      c. Color: As selected by Architect from manufacturer's full range.
   3. Panel Coverage: 10 inches.
   4. Panel Height: 0.75 inches.

2.03 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

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3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

2.04 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
1. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

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2.05 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:
1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

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3.03 INSTALLATION

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Shim or otherwise plumb substrates receiving metal panels.
   2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
   3. Install screw fasteners in predrilled holes.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Install flashing and trim as metal panel work proceeds.
   6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
   8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
   1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
   1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
   2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
   3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
   4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
   5. Flash and seal panels with weather closures at perimeter of all openings.

E. Watertight Installation:
   1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.

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2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. 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 waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

B. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

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3.05 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 07 65 00 - FLEXIBLE FLASHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Self-adhering flexible flashing.
   2. Liquid-applied flexible flashing.

B. Related Sections:
   1. Section 07 25 00 "Weather Barriers" for flexible flashings integral to weather barrier assemblies.
   2. Section 07 60 00 "Flashing and Sheet Metal" for sheet metal flashing.

1.02 ACTION SUBMITTALS

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

B. Shop Drawings: Show installation layouts of flashing, including plans, elevations, expansion-joint locations, and keyed details.
   1. Include details for forming, joining, supporting, and securing flashing, including termination points, expansion joints, edge conditions, special conditions, and connections to adjoining work.
   2. Include identification of material and thickness for each item.

C. Samples: For each exposed product and for each finish specified.

1.03 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of flexible flashing product, for tests performed by a qualified testing agency.

B. Maintenance data.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Flexible Flashing Performance, General: Flexible flashing seals with adjacent construction shall be capable of performing as a continuous air and water barrier. Flexible flashing shall be capable of accommodating substrate movement, construction material changes, penetrations, and transitions without deterioration, water penetration under pressure differential, and air leakage exceeding specified limits.

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B. Self-Adhering Flexible Flashing Performance: Self-adhering flexible flashing shall meet minimum performance requirements when tested according to AAMA 711.

2.02 SELF-ADHERING FLEXIBLE FLASHING

A. Self-Adhering Flexible Flashing: Cold-applied flashing tape, a minimum of 30 mils thick, consisting of a polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing, in factory cut widths.
   1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
      b. Henry; Blueskin TWF.
      c. W.R. Meadows; Air-Shield Thru-Wall Flashing.
   2. Locations: Transition flashing at sheathing, metal flashings, and other locations indicated.

B. High Temperature Self-Adhering Membrane Flashing: Cold-applied flashing tape, a minimum of 30 mils thick, consisting of a polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing, in factory cut widths.
   1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Protecto Wrap: Sill Pan Flash Butyl.
      b. Henry; FortiFlash Butyl Waterproof Flashing Membrane.
   2. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
   3. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
   4. Locations:
      a. Beneath metal copings.
      b. Other locations indicated.

C. Foil-Faced Self-Adhering Membrane Flashing: Cold-applied flashing tape, a minimum of 30 mils thick, consisting of a glass scrim reinforced aluminum foil laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing, in factory cut widths.
   1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Henry; Metal Clad.
      b. Polyguard; Aluma-Flash.
      c. W.R. Meadows; Air-Shield Aluminum Flashing.
      d. Karnak; 550 Patch-N-Go.
      e. Soprema; Soprasolin HD.
      f. GCP
   2. Locations:
      a. Glazed framing assemblies.
      b. Wall penetrations and wall openings.

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c. Other locations indicated.

D. Liquid Mastic: Liquid mastic recommended by flashing manufacturer.

2.03 LIQUID-APPLIED FLEXIBLE FLASHING

A. Multicomponent, Reinforced, Polymethyl Methacrylate (PMMA) Flashing:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Kemper System Kemperol AC Speed FR or comparable product by one of the following:
a. Soprema.
b. Siplast.
2. Membrane-Reinforcing Fabric: Manufacturer's recommended polyester fabric reinforcement.
3. Thickness: 90 mils, minimum.
4. Primer: As recommended by manufacturer for substrates indicated.
5. Finish Coat: Manufacturer's standard finish coat of type required and recommended for application over PMMA flashing membrane.
a. Color: As selected by Architect from manufacturer's full range.
6. Locations:
a. Door sills.
b. Rough openings.
c. Transitions at waterproofing membranes.
d. Other locations indicated.

2.04 MISCELLANEOUS MATERIALS

A. General: Provide materials required for complete flashing installation as recommended by manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. General: Install flashing securely in place, with provisions for thermal and structural movement so that completed flashing shall not leak and shall remain watertight.
1. Install flashing and sheet metal true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install flashing to fit substrates and conform to geometry of area receiving flashing resulting in watertight performance.

3.02 SELF-ADHERING FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
1. Clean, prepare, prime, and treat substrates according to manufacturer's written instructions.

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2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Apply in a shingled manner to shed water without interception by any exposed sheet edges.
4. Roll firmly to enhance adhesion to substrates.

3.03 LIQUID-APPLIED FLEXIBLE FLASHING INSTALLATION

A. Apply flashing where indicated to comply with manufacturer's written instructions.
1. Clean, prepare, prime, and treat substrates according to manufacturer's written instructions.
2. Mix materials and apply flashing by roller, notched squeegee, trowel, or other suitable application method.
3. Apply first coat of liquid-applied flashing, embed membrane-reinforcing fabric, and apply second coat of liquid-applied flashing to completely saturate reinforcing fabric and to obtain a seamless reinforced flashing membrane free of entrapped gases and pinholes, with an average dry film total thickness of 90 mils.
4. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
5. Apply masking tape to each side of joint, outside of area to be covered by flashing system.

3.04 CLEANING AND PROTECTION

A. Protect flexible flashings from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect flexible flashings from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace flexible flashing materials according to manufacturer's written instructions.
2. Protect flexible flashings from contact with incompatible materials and sealants not approved by manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Sealant and backing materials.
   2. Acoustical sealants.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.
   2. Section 07 65 00 "Flexible Flashing" for preformed extruded-silicone joint seals.

1.02 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. 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 for the following joints:
   1. Sanded sealant joints.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for sealants, indicating VOC content.

B. Product Test Reports: For each kind of joint sealant.

C. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

D. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

E. Field-Adhesion-Test Reports: For each sealant application tested.

F. Sample Warranties: For special warranties.

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1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

1.05 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
   5. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

1.06 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 or are below 40 deg F.
   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.

1.07 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.

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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:
      a. Silicone Sealants: 20 years from date of Substantial Completion.
      b. All Other Sealants: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Sealants:
      a. VOC content limits for field applications.

2.02 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.03 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. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

C. Nonstaining Joint Sealants: Where sealants are indicated to be nonstaining, provide products that exhibit no staining of substrates when tested according to ASTM C1248.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with the following public health and safety requirements:
   1. Sealant is certified for compliance with NSF standards for end-use application indicated.
   2. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.

E. Mildew-Resistant Joint Sealants: Where sealants are indicated to be mildew-resistant, provide products formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

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F. Colors of Exposed Joint Sealants: Custom colors as directed by Architect.

2.04 JOINT SEALANTS

A. Silicone: Single-component, nonsag, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
   1. Joint Locations: Exterior joints in vertical surfaces and horizontal nontraffic surfaces, and as follows:
      a. Construction joints in cast-in-place concrete.
      b. Joints between plant-precast architectural concrete units.
      c. Control and expansion joints in unit masonry.
      d. Joints in dimension stone cladding.
      e. Joints in exterior insulation and finish systems.
      f. Joints between metal panels.
      g. Joints between different materials listed above.
      h. Perimeter joints between materials listed above and frames of windows.
      i. Control and expansion joints in ceilings.
      j. .
      k. Other joints as indicated on Drawings.
   2. Basis-of-Design Product: The Dow Chemical Company; DowSil 790, 791, or 795 at Contractor's option.
      a. Subject to compliance with requirements, manufacturers offering comparable products that may be incorporated into the Work include, but are not limited to, the following:
         1) GE Construction Sealants; Momentive Performance Materials Inc.
         2) Pecora Corporation.
         3) Sika Corporation; Joint Sealants.
         4) Tremco Incorporated.

B. Silicone: Single-component, nonsag, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
   1. Joint Locations: Sealant joints in contact with weather barrier, weather barrier flashing materials, and as follows:
      a. Perimeter joints between materials listed above and frames of windows glazed framing systems and louvers.
   2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
      a. The Dow Chemical Company; DowSil 758 Silicone Weather Barrier Sealant.
      b. Pecora Corporation; AVB Silicone.

C. Silicone: Mildew-resistant, single-component, nonsag, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
   1. Joint Locations: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces, and as follows:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.

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b. Tile control and expansion joints in wet locations.
c. .
d. Other joints as indicated on Drawings.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
   a. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
   b. The Dow Chemical Company; DowSil 786.

D. Urethane: Multicomponent, nonsag, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Uses T and NT.
1. Joint Locations: Interior joints in horizontal traffic surfaces, and as follows:
   a. Isolation joints in cast-in-place concrete slabs.
   b. Control and expansion joints in tile flooring.
   c. .
   d. Other joints as indicated on Drawings.
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
   a. BASF Corporation; MasterSeal NP 2.
   b. LymTal International Inc; Iso-Flex 881 or Iso-Flex 885 SG.
   c. Pecora Corporation; Dynatred.
   d. Sika Corporation; Joint Sealants; Sikaflex 2c NS TG.

E. Urethane: Multicomponent urethane joint sealant; ASTM C920, Type M, Class 25 or greater; Grade NS for sloping and vertical applications and Grade P for deck applications; Use NT. Compatible with asphalt-base waterproofing materials and as recommended by manufacturer for substrate and joint conditions.
1. Joint Locations: Perimeter of waterproofing and roofing, and roofing accessories.

F. Urethane: Single-component, nonsag, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Joint Locations: Interior joints in vertical surfaces and horizontal nontraffic surfaces, and as follows:
   a. Tile control and expansion joints.
   b. Other joints as indicated on Drawings.
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
   a. Pecora Corporation; Dynatrol I-XL.
   b. Polymeric Systems, Inc; Flexiprene 1000.
   c. Sika Corporation; Joint Sealants; Sikaflex Textured Sealant.
   d. Tremco Incorporated; Dymonic.

G. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
1. Joint Locations: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement, and as follows:
   a. Control joints on exposed interior surfaces of exterior walls.

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b. Perimeter joints between interior wall surfaces and frames of windows glazed framing systems.
c. Other joints as indicated on Drawings.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. BASF Corporation; MasterSeal NP 520.
b. Bostik, Inc.; Bosti-Flex Plus.
c. Pecora Corporation; AC-20.
d. Tremco Incorporated; Tremflex 834.

H. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 or aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.
1. Joint Locations: Interior, exposed sawcuts and non-moving control joints in concrete slabs.
2. Color: As selected by Architect from manufacturer's full range.
3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. BASF Corporation; MasterSeal CR 190.
b. Sika Corporation; Joint Sealants; Sikadur 51.

2.05 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834. Sealant effectively reduces airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E90.
1. Joint Location:
a. Acoustical joints where indicated.
b. Other joints as indicated.
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. Accumetric LLC; BOSS 826 Acoustical Sound Sealant.
b. GE Construction Sealants; Momentive Performance Materials Inc.; RCS20 Acoustical.
c. Grabber Construction Products; Acoustical Sealant GSC.
d. Hilti, Inc.; CP 506 Smoke and Acoustical Sealant.
e. Pecora Corporation; AC-20 FTR.
f. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
g. Tremco Incorporated; Tremflex 834.

2.06 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.

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B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), unless otherwise recommended by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.07 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.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Mineral Wool Forming Material: Unfaced mineral wool board insulation preformed or cut to fit metal deck flutes.

PART 3 - EXECUTION

3.01 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 laitance and form-release agents from concrete.
   2. 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.

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.

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3.02 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 C1193 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 C1193 unless otherwise indicated.

G. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters including heads of walls, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

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3.03 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.

END OF SECTION

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:
   1. Standard hollow-metal frames.
   2. Custom exterior hollow-metal frames.

B. Related Sections:
   1. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.02 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.03 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.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, core descriptions, and finishes.

B. Product Schedule: For hollow-metal frames, 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.

1.05 INFORMATIONAL SUBMITTALS

A. Field quality control reports.

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1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal frames 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 to permit air circulation.

PART 2 - PRODUCTS

2.01 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; AADG, Inc.; ASSA ABLOY.
   2. Curries, AADG, Inc.; ASSA ABLOY Group.
   3. DCI Hollow Metal on Demand.
   4. Deansteel Manufacturing Company, Inc.
   5. Mesker Door; Mesker Openings Group.
   6. Republic Doors and Frames; a Allegion brand.
   7. Security Metal Products; a brand of ASSA ABLOY.
   8. Steelcraft; Allegion plc.

2.02 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.7 when tested according to ASTM C518.

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2.03 INTERIOR STANDARD STEEL FRAMES

A. Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. .
1. Frames:
   a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
   b. Frames: Fabricated from same thickness material as adjacent door frame.
   c. Construction: Full profile welded.
2. Exposed Finish: Prime.

2.04 EXTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

A. Commercial Frames: NAAMM-HMMA 861; ANSI/SDI A250.4, Physical Performance Level A. .
1. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide; with minimum G60 or A60 coating.
   b. Construction: Full profile welded.
2. Exposed Finish: Prime.

2.05 BORROWED LITES

A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Face welded.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.06 FRAME ANCHORS

A. Jamb Anchors:
1. Type: Anchors of minimum size and type required by applicable frame standard, and suitable for performance level indicated.

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2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

2.07 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.

E. 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.

F. Mineral-Fiber Insulation: ASTM C665, 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 E136 for combustion characteristics.

2.08 FABRICATION

A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

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1. 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 welding, or by rigid mechanical anchors.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. 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.

B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal frames for hardware.

2.09 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 ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.01 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. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.02 INSTALLATION

A. Install hollow-metal frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 for standard and NAAMM-HMMA 840 for custom.

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1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
   a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
   b. Install frames with removable stops located on secure side of opening.
2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames 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.

3.03 REPAIR

A. 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.

END OF SECTION

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Solid-core flush wood veneer-faced doors for transparent finish.
2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:
1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.
2. Section 08 81 00 "Glass Glazing" for glass view panels in flush wood doors.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:
1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Dimensions and locations of blocking for hardware attachment.
5. Dimensions and locations of mortises and holes for hardware.
6. Clearances and undercuts.
7. Doors to be factory finished and application requirements.
8. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Verification:
1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:

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1. Documentation for composite wood products, indicating compliance with emissions testing or certification.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.05 QUALITY ASSURANCE

A. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.07 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 temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

1.08 WARRANTY

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. Delamination of veneer.
      b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
      c. 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.

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PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Flush Wood Door Manufacturers: Subject to compliance with requirements, unless indicated otherwise, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Masonite Architectural.
   2. Lynden Door, Inc.
   3. Oregon Door.
   4. Oshkosh Architectural Door Company.
   5. Poncraft Door Company.
   6. Vancouver Door Company.
   7. VT Industries Inc.

2.02 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Wood Doors:
      a. VOC emissions testing or certification.
   2. Composite Wood Products:
      a. Formaldehyde emissions testing or certification.

2.03 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with ANSI/WDMA I.S. 1A.
   1. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

2.04 VENEERED-FACED FLUSH WOOD DOORS FOR TRANSPARENT FINISH

A. Interior Doors:
   1. Performance Grade: ANSI/WDMA I.S. 1A Extra Heavy Duty .
   2. ANSI/WDMA I.S. 1A Grade: Premium.
   3. Faces: Single-ply wood veneer not less than 1/50 inch thick.
      a. Species: Select white birch .
      b. Cut: Plain sliced (flat sliced).
      c. Match between Veneer Leaves: Book match.
      d. Assembly of Veneer Leaves on Door Faces: Center-balance match.
   4. Core for Non-Fire-Rated Doors:
      a. ANSI A208.1, Grade LD-1 or Grade LD-2 particleboard.
         1) Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

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5. Construction: Five or seven plies, stiles and rails bonded to core, with entire unit abrasive planed before veneering.

2.05 LIGHT FRAMES AND LOUVERS

A. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated on Drawings.

2.06 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.
1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.
1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Factory cut and trim openings through doors.
1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 81 00 "Glass Glazing."

2.07 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.
1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Factory finish doors where indicated in schedules or on Drawings as factory finished.

D. Transparent Finish:
1. ANSI/WDMA I.S. 1A Grade: Premium.

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2. Finish: Architectural Woodwork Standards System-9, UV Curable, Acrylated Epoxy, Polyester or Urethane.
3. Finish: ANSI/WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
4. Sheen: Satin.

PART 3 - EXECUTION

3.01 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.

3.02 INSTALLATION

A. Hardware: For installation, see Section 08 71 00 "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.
1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
2. Anchor frames to anchors or blocking built in or directly attached to substrates.
a. Secure with countersunk, concealed fasteners and blind nailing.
b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
1) For factory-finished items, use filler matching finish of items being installed.

D. Job-Fitted Doors:
1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
2. Machine doors for hardware.
3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
4. Clearances:
a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
c. Where threshold is shown or scheduled, provide1/4 inch from bottom of door to top of threshold unless otherwise indicated.

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d. Comply with NFPA 80 for fire-rated doors.

5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
6. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.03 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:
1. Provide inspection of installed Work through WI's Certified Compliance Program, certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCA/WI's "Architectural Woodwork Standards" for the specified grade.
2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
3. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 101.

3.04 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

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SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Exterior storefront framing.
   2. Exterior manual-swing entrance doors.

B. Related Sections:
   1. Section 08 81 00 "Glass Glazing" for storefront glazing.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples: For each exposed finish required.

1.03 INFORMATIONAL SUBMITTALS

A. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

B. Design Data Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

D. Product test reports.

E. Field quality-control reports.

F. Sample warranties.

G. Maintenance data.

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1.04 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.05 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Assembly: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Arcadia, Inc.
   2. Kawneer North America, an Arconic company.
   3. Oldcastle, Inc.
   4. YKK AP America Inc.

B. Source Limitations: Obtain all components of aluminum-framed entrances and storefront, including framing and accessories, from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design aluminum-framed entrances and storefronts.

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B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   2. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Noise or vibration created by wind and thermal and structural movements.
      d. Loosening or weakening of fasteners, attachments, and other components.
      e. Failure of operating units.

C. Structural Loads:
   1. Wind Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:
   1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

E. Structural: Test according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
   1. Fixed Framing and Glass Area:
      a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
   2. Entrance Doors:
      a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

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b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 8 lbf/sq. ft..

H. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor):
a. Fixed glazing and framing areas shall have U-factor of not more 0.41 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
b. Thermal Entrance Doors: Door framing and glazing asembly shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.25 as determined according to NFRC 200.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.03 FRAMING

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Arcadia.
2. Kawneer North America.
3. Oldcastle Building Envelope.
4. YKK AP America Inc.

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: High-performance organic finish.
5. Fabrication Method: Field-fabricated stick system.

C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

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D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

E. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
a. Sheet and Plate: ASTM B 209.
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.04 THERMAL ENTRANCE DOOR SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Arcadia; Thermal Entrance Door.
2. Kawneer North America; Insulclad Thermal Entrances.
3. Oldcastle Building Envelope; AD-375 Medium Stile Thermal Door.
4. YKK AP America Inc.; Megatherm Doors.

B. Thermal Entrance Doors: Manufacturer's high-performance thermal glazed entrance doors for manual-swing operation.
1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: As indicated.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

2.05 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 08 71 00 "Door Hardware."

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B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.
   1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
   2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
   3. Opening-Force Requirements:
      a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbfto set the door in motion and not more than 15 lbf to open the door to its minimum required width.
      b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
   1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
   2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Pivot Hinges: BHMA A156.4, Grade 1.
   1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

E. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

F. Manual Flush Bolts: BHMA A156.16, Grade 1.

G. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

H. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

I. Cylinders: As specified in Section 08 71 00 "Door Hardware."

J. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

K. Operating Trim: BHMA A156.6.

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L. Removable Mullions: BHMA A156.3, extruded aluminum.
1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

M. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

N. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

O. Weather Stripping: Manufacturer's standard replaceable components.

P. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

Q. Silencers: BHMA A156.16, Grade 1.

R. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.06 GLAZING

A. Glazing: Comply with Section 08 81 00 Glass Glazing.

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

2.07 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.

B. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

C. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

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2.08 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from exterior.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.09 ALUMINUM FINISHES

A. High-Performance Organic Finish, Two-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
   1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions .
   2. Color and Gloss: As indicated on Drawings .

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PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Comply with manufacturer's written instructions.
   2. Do not install damaged components.
   3. Fit joints to produce hairline joints free of burrs and distortion.
   4. Rigidly secure nonmovement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:
   1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
   2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Section 08 81 00 "Glass Glazing."

F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
   1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.02 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed storefronts.
   1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

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a. Perform a minimum of three tests in areas as directed by Architect.

C. Aluminum-framed storefronts will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION

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SECTION 08 56 73 - SOUND CONTROL WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Sound control windows.

1.02 ACTION SUBMITTALS

A. Product data.

B. Shop Drawings:
   1. Elevations of each type and style of window; details of windows, frames, anchorages, wall-opening conditions, and sound control seals.

C. Samples for Verification: For each type of exposed finish not less than 3 by 5 inches.

D. Product Schedule: For sound control windows. Use same designations indicated on Drawings.

1.03 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each sound control window, for tests performed by a qualified testing agency or manufacturer and witnessed by a qualified testing agency.

B. Sample warranties.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating sound control wiindows that meet or exceed assembly performance requirements indicated and of documenting this performance by test reports and calculations.

1.06 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of sound control windows that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Acoustic Performance: Provide sound control windows with minimum STC 42 for the entire assembly, calculated in accordance with ASTM E413 when tested in an operable condition in accordance with ASTM E90.

2.02 STEEL SOUND CONTROL WINDOWS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Overly Door Company; Sound Retardant Metal Fixed Window System or comparable product by one of the following:
   1. AMBICO Limited.
   2. IAC Acoustics.
   3. Krieger Specialty Products Company.
   4. Noise Barriers, LLC.
   5. Protective Door Industries.

B. Assemblies: Comply with requirements in NAAMM-HMMA 865 unless otherwise specified or indicated on Drawings. Provide complete assemblies with hollow-metal frames, sound seals, and specified glazing and accessories.

C. Hollow-Metal Frames: NAAMM-HMMA 820, continuously welded frames with corners mitered and reinforced.
   1. Interior Frames: Provide straight returns.
      a. Commercial-Quality Steel Sheet: Hot or Cold rolled, in thickness required to support window and comply with assembly performance requirements but not less than 0.075-inch nominal thickness.

D. Supports and Anchors:
   1. Jamb Anchors: Anchors of minimum size and type required by wall construction and assembly performance requirements.
      a. Postinstalled Expansion Anchors: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

E. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

F. Materials:
   1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
   2. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

G. Finishes:

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1. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with requirements in SDI A250.3 for performance and acceptance criteria.
    a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.03 ACCESSORIES

A. Sound Control Seals: Manufacturer's standard sound control system required to comply with assembly performance requirements.

2.04 GLAZING

A. Glass and Glazing: Manufacturer's glazing system complying with assembly performance requirements.
    1. Glass: ASTM C1036, Type 1, q3, safety glass complying with testing requirements in 16 CFR 1201 for category based on lite size.

2.05 FABRICATION

A. Fabrication Standard: Comply with requirements in NAAMM-HMMA 865 unless otherwise specified or indicated on Drawings.

B. Glazing:
    1. Glazed Lites: Factory install glazed lites in accordance with requirements of tested assembly and to comply with assembly performance requirements.

2.06 FRAME ANCHORS

A. Hollow-Metal Window Frames: Fabricate to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
    1. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners or provide plug buttons to conceal fasteners.
    3. Frame Anchors:
        a. Type: Anchors of minimum size and type required by applicable frame standard, and suitable for performance requirements indicated.

PART 3 - EXECUTION

3.01 INSTALLATION OF SOUND CONTROL WINDOWS

A. General: Install sound control windows plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.

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B. Welded Frames: Set accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. Check squareness, twist, and plumbness of frames as walls are constructed. Shim as necessary to comply with installation tolerances. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   1. Metal-Stud Partitions: Fully fill frames with mineral-fiber insulation.

C. Sound Control Seals: Where seals have been factory prefit and preinstalled and subsequently removed for shipping, reinstall seals and adjust in accordance with manufacturer's written instructions.

D. Glazing: Comply with installation requirements in Section 08 81 00 "Glass Glazing" and with manufacturer's written instructions.
   1. Secure stops with tamper-resistant countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.02 ADJUSTING AND CLEANING

A. Factory-Applied Paint Touchup: Immediately after installation, repair damaged areas of factory-applied paint and touchup in accordance with manufacturer's written instructions.

B. Remove and replace defective work, including defective or damaged sound seals and frames that are warped, bowed, or otherwise defective.

END OF SECTION

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SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
1. Division 08: Section - Hollow Metal Doors and Frames.
2. Division 08: Section - Flush Wood Doors.
3. Division 08: Section - Aluminum-Framed Storefronts.

1.03 REFERENCES

A. 2022 California Building Code, CCR Title 24, Part 2

B. BHMA - Builders' Hardware Manufacturers Association

C. DHI - Door and Hardware Institute

D. NFPA - National Fire Protection Association.
1. NFPA 80 - Fire Doors and Other Opening Protectives
2. NFPA 105 - Smoke and Draft Control Door Assemblies

E. UL - Underwriters Laboratories.
1. UL 10C - Fire Tests of Door Assemblies
2. UL 305 - Panic Hardware

F. WHI - Warnock Hersey Incorporated

G. SDI - Steel Door Institute

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1.04 SUBMITTALS & SUBSTITUTIONS

A. General: Submit in accordance with Conditions of the Contract and Division 01 Specification sections.

B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Submit electronic PDF copies of schedule organized vertically into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
1. Include a Cover Sheet with:
   a. Job Name, location, telephone number.
   b. Architects name, location and telephone number.
   c. Contractors name, location, telephone number and job number.
   d. Suppliers name, location, telephone number and job number.
   e. Hardware consultant's name, location and telephone number.
2. Job Index information included:
   a. Numerical door number index including; door number, hardware heading number and page number.
   b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
   c. Manufacturers' names and abbreviations for all materials.
   d. Explanation of abbreviations, symbols, and codes used in the schedule.
   e. Mounting locations for hardware.
   f. Clarification statements or questions.
   g. Catalog cuts and manufacturer’s technical data and instructions.
3. Vertical schedule format sample:

Heading Number 1 (Hardware group or set number - HW Group #1)				
(a) 1 Single - Door #101 - Corridor 101 to Exterior			(b) 90°	(c) RH
(d) 3'-0" x 7'-0" x 1-3/4" - Wood Door x Hollow Metal Frame - 20 Minute				
(e) 1.	(f) 3 ea	(g) Hinges - (h) 5BB1 4.5 x 4.5 NRP (i) 1/2 TMS	(j) 630	(k) IVE
2.	1 ea	Lockset - ND80P6D x RHO x RH x 10-025 x JTMS	626	SCH
3.	1 ea	Closer - 4040XP x EDA x TBSRT	689	LCN

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a) Single or pair of doors with opening number and location.
b) Degree of opening.
c) Hand of door(s).
d) Door/frame dimensions and material; Label requirements, if any.
e) Hardware item line # (Optional).
f) Quantity.
g) Product description.
h) Product part number.
i) Fastenings and other pertinent information.
j) Hardware finish codes per ANSI/BHMA A156.18.
k) Manufacturer abbreviation.

D. Make substitution requests in accordance with Division 01. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.

E. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

F. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

G. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.

H. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.

1.05 QUALITY ASSURANCE

A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
1. Responsible for detailing, scheduling and ordering of finish hardware.

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2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing. To maintain the integrity of patented key systems provide a letter of authorization from the specified manufacturer indicating that supplier has authorization to purchase the key system directly from the manufacturer.
3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.

C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.

D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

F. Product packaging to be labelled in compliance with CA Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986.

1.06 DELIVERY, STORAGE AND HANDLING

A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.

B. Hardware items shall be individually packaged in manufacturers’ original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.

C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.

D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.07 WARRANTY

A. Provide warranties of respective manufacturers’ regular terms of sale from day of final acceptance as follows:

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1. Locksets: Ten (10) years.
2. Exit devices: Three (3) years.
3. Closers: Thirty (30) years.
4. All other hardware: Two (2) years.

1.08 MAINTENANCE

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.

1.09 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least one week prior to beginning work of this section.

B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key Owner's Personnel, and Project Inspector.

C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review Owner's keying standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Item	Manufacturer	Acceptable Substitutes
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches & Cylinders	Schlage	None – District Standard
Exit Devices	Von Duprin	None – District Standard
Closers	LCN	None – District Standard
Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Door Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

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2.02 MATERIALS

A. Hinges:
1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Hinges shall be sized in accordance with the following:
   a. Height:
      1) Doors up to 42" wide: 4-1/2 inches.
      2) Doors 43" to 48" wide: 5 inches.
   b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
   c. Number of Hinges: Provide 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
3. Exterior out-swinging hinges shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
4. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.

B. Continuous Hinges:
1. Provide aluminum geared continuous hinges fabricated from 6063-T6 aluminum conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
3. Provide continuous hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
4. Provide continuous hinges 1” shorter in length than nominal height of door, unless otherwise noted, with symmetrical hole pattern.
5. Install continuous hinges with fasteners supplied by manufacturer.

C. Heavy Duty Cylindrical Locks and Latches: Schlage “ND" Series as scheduled with "Rhodes" lever design.
1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3 hour fire doors.
2. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
   a. Abusive locked lever torque – minimum 3,100 inch-pounds without gaining access.
   b. Offset lever pull – minimum 1,600 foot pounds without gaining access.
   c. Vertical lever impact – minimum 100 impacts without gaining access.
   d. Cycle Test – tested to minimum 16 million cycles with no visible lever sag; without the use of performance aids such as set screws or spacers.
3. Cylinders: Refer to “KEYING” article, herein.
4. Provide locks with standard 2-3/4” backset, unless noted otherwise, with 1/2” latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate solid steel anti-rotation thru-bolts, and no exposed screws.

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6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
9. Provide levers with vandal resistant technology as scheduled for use at abusive applications.

D. Exit devices: Von Duprin as scheduled.
1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 standards.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Provide exit devices cut to door width and height. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
6. Provide flush end caps for exit devices.
7. Exit devices shall comply with CBC Section 11B-404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
8. Provide exit devices UL certified to meet 5 lbs. maximum unlatching force requirements according to the CBC Section 11B-309.4.
9. Cylinders: Refer to “KEYING” article, herein.
10. Provide cylinder dogging as specified at non fire-rated openings. Provide cylinder dogging indicators (CDSI) for visible indication of dogging status as specified.
11. Removable Mullions: Provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
15. Provide exit devices with manufacturer’s approved strikes.
16. Panic hardware shall not be provided with “Night Latch” (NL) function for any accessible doors or gates unless the following conditions are met per DSA Interpretation 10-08 DSA/AC. Such conditions must be clearly demonstrated and indicated in the specification:
    a. Panic hardware contains a “dogging” feature and during the time the facility is open the panic hardware shall be “dogged”.

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b. The act of “dogging” a door in the open position shall only be performed by employees as a part of their job function (non-public use).

E. Closers: LCN as scheduled.
1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Provide certificate by independent testing laboratory that door closers have completed over 10,000,000 cycles and can still meet ANSI/BHMA A156.4 standards.
4. Cylinder Body: 1-1/2” diameter with 3/4” diameter double heat-treated pinion journal.
5. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120° F to -30° F.
6. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
7. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
8. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
9. Pressure Relief Valve (PRV) Technology: Not permitted.
10. Provide door closers powder coated to match balance of door hardware. Powder coating finish shall be certified to exceed 100 hours salt spray testing as described in ANSI/BHMA A156.4 and ASTM B117.
11. Provide special rust inhibitor (SRI) in highly corrosive areas, and where noted in hardware sets.
12. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

F. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
1. Automatic flush bolts shall be of the low operating force design.
2. Provide top bolt only model for interior doors where applicable and as permitted by testing procedures.
3. Provide dust proof strikes at openings using bottom bolts.
4. Manual flush bolts shall only be permitted on storage or mechanical openings, as scheduled.

G. Door Stops/Holders
1. Unless otherwise noted in hardware sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide overhead type.

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2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).
3. Provide backing plate at wall framing behind wall type.
4. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions. Stop-only function shall be provided at fire-rated openings.
5. Mount door stops/holders at single height.
6. Align adjacent stops/closers at double doors.
7. Provide matching floor or wall stops/holders at double doors, unless otherwise indicated.
8. Provide risers for floor mounted door stops/holder as required
9. Mechanical door holder not allowed at door leaves with auto operators.

H. Protection Plates:
1. Provide kick, mop, and/or armor plates minimum of 0.050” thick, with four beveled edges. Furnish with sheet metal or wood screws, finished to match plates.
2. Kick plates shall be sized 10" high and 2" less door width (LDW) at single doors and 10” high and 1” LDW at pairs or doors.
3. Provide mop and armor plates with sizes as scheduled in hardware sets.

I. Thresholds: As scheduled and per details.
1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope. Thresholds shall comply with CBC Section 11B-404.2.5.
2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 07 “Thermal and Moisture Protection”.
3. Use 1/4” fasteners, red-head flat-head sleeve anchors (SS/FHSL).

J. Seals: Provide silicone gasket at all rated and exterior doors.
1. Smoke & Draft Control Doors: Provide UL10C Classified gasketing that complies with NFPA 80 & NFPA 252 for use on “S” labeled Positive Pressure door assemblies.

K. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.03 KEYING

A. Furnish a Proprietary Schlage masterkey system as directed by the owner or architect. Key system to be designated and combinated by the Schlage Master Key Department even if pinned by the Authorized Key Center, Authorized Security Center or a local authorized commercial dealer.

B. A detailed keying schedule is to be prepared by the owner and/or architect in consultation with a representative of Allegion or an Authorized Key Center or Authorized Security

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Center. Each keyed cylinder on every keyed lock is to be listed separately showing the door #, key group (in BHMA terminology), cylinder type, finish and location on the door.

C. Extend the original Schlage masterkey system established for the project.

D. Furnish all cylinders in the Schlage Full Size Interchangeable Core (FSIC). Pack change keys independently (PKI)

E. Furnish construction keying for doors requiring locking during construction.
1. For FSIC systems provide 23-030-ICX Full Size Construction Cores
2. For FSIC systems provide ten 48-101-ICX Construction Keys
3. For FSIC systems provide two 48-056-ICX Control Keys (const.)
4. For FSIC systems provide two control keys for installing the permanent cores (49-056 for “Classic” keyways, 48-052-XP for “Classic Primus”) (49-003 for “Everest Conventional”, 48-005–XP for “Everest Primus”)

F. Furnish all keys with visual key control. (Not all options listed below are available at the same time.)
1. Stamp key “Do Not Duplicate”.
2. Stamp (BHMA) key symbol on key.

G. Furnish all cylinders with visual key control. (Not all options listed below are available at the same time.)
1. Stamp (BHMA) key symbol on side of cylinder (CKC).

H. Furnish mechanical keys as follows:
1. Furnish 2 cut change keys for each different change key code.
2. Furnish 1 uncut key blank for each change key code.
3. Furnish 6 cut masterkeys for each different masterkey set.
4. Furnish 3 uncut key blanks for each masterkey set.
5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
6. Furnish 1 cut control key cut to each SKD combination.
7. Furnish KS43D2200 padlock for use with non-I/C Schlage cylinders. Furnish 47-413 (conventional) or 47-743-XP (PrimusXP) with above.
8. Furnish KS43G3200 padlock for use with FSIC Schlage cylinders. Furnish 23-030 (Classic / Everest) or 20-740 (PrimusXP) with above.
9. Furnish KS41D1200 padlock for use with SFIC Schlage cylinders. Furnish 80-037 (Everest-B) with above.

2.04 FINISHES

A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.

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B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.

C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.

D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.05 FASTENERS

A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.

B. Screws for butt hinges shall be flathead, countersunk, full-thread type.

C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.

D. Provide expansion anchors for attaching hardware items to concrete or masonry.

E. All exposed fasteners shall have a phillips head.

F. Finish of exposed screws to match surface finish of hardware or other adjacent work.

G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.

B. Beginning of installation means acceptance of existing conditions.

C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2016 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record

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shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.

B. Use the templates provided by hardware item manufacturer.

C. Mounting heights for hardware shall be as recommended by DHI. Operating hardware shall be located between 34" and 44" above finish floor to comply with CBC Section 11B-404.2.7.

D. Door Closers:
1. Place door closers inside building, stairs, rooms, etc. Closers shall be installed to permit doors to swing 180 degrees or maximum allowable by conditions.
2. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors.
3. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal.
4. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. 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.
5. Compensating devices or automatic door operators may be utilized to meet the above standards.
6. Per CBC Section 11B-404.2.8.1, doors shall take minimum of 5 seconds to move from an open position of 90 degrees to 12 degrees to the latch jamb.

E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

G. Set thresholds for exterior doors in full bed of butyl-rubber sealant.

H. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

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3.03 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surface soiled by hardware installation.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.

E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 HARDWARE LOCATIONS

A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.05 FIELD QUALITY CONTROL

A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

3.06 HARDWARE SCHEDULE

A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.

B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for

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examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.

C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

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GROUP NO. 01

1	EA	CONT. HINGE	112XY	628	IVE
1	EA	VANDL OFFICE LOCK	ND91TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	SET	SEAL SET	WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

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GROUP NO. 02

1	EA	CONT. HINGE	112XY	628	IVE
1	EA	VANDL OFFICE LOCK	ND91TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	SET	SEAL SET	WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

GROUP NO. 03

1	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	VANDL OFFICE LOCK	ND91TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

GROUP NO. 04

1	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL CLASSROOM LOCK	ND94TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS444	626	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

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GROUP NO. 05

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL CLASSROOM SEC W/ INSIDE INDICATOR	ND98TD RHO IS-CRS	626	SCH
2	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS444	626	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

GROUP NO. 06

1	EA	CONT. HINGE	112XY	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	SET	SEAL SET	WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

GROUP NO. 07

3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

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GROUP NO. 08

2	EA	CONT. HINGE	112XY	628	IVE
1	EA	REMOVABLE MULLION	KR4954	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-L-DT-06	626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-L-KC-06	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	26-091 ICX	626	SCH
2	EA	MORTISE CYLINDER	26-091 XQ11-948 ICX	626	SCH
4	EA	PRIMUS CORE	20-740	626	SCH
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	SET	SEAL SET	WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL		

GROUP NO. 09

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	FLOOR STOP	FS439	682	IVE

GROUP NO. 10

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

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GROUP NO. 11

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

GROUP NO. 12

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK W/ OUTSIDE INDICATOR	ND40S RHO OS-OCC	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

GROUP NO. 13

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

END OF SECTION

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SECTION 08 81 00 - GLASS GLAZING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Doors.
   2. Storefront framing.
   3. Glazing sealants and accessories.

1.02 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.04 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:

B. Design Data Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Product Certificates: For glass.

D. Product Test Reports: For coated glass, insulating glass andglazing sealants, for tests performed by a qualified testing agency.

E. Sample Warranties: For special warranties.

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1.05 QUALITY ASSURANCE

A. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.

C. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.

1.06 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations for Glass: Obtain coated glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

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2.02 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the California Building Code and ASTM E1300.
   1. Design Wind Pressures: As indicated on Drawings and in accordance with ASCE 7.
   2. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
   3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
   4. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
   2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   3. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
   4. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
   5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.03 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

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1. IGMA Publication Insulating Glazing Tolerances: IGMA TB-1200, "Guidelines for Insulating Glass Dimensional Tolerances."
2. IGMA Publication for Insulating Glass: IGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
3. IGMA Publication for Thermal Stress: IGMA TM-1500, "Guidelines to Reduce Instances of Thermal Stress."
4. NGA Publications: "Guidelines for the Appearance of Insulating Glass Unit Edges in Commercial Applications at the Time of Installation."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.04 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Nickel Sulfide Inclusion Breakage Resistance: Exterior fully tempered glazing shall be heat soak tested in accordance with EN14179, including a minimum 2-hour dwell at 260 degrees C, +/- 10 degrees (554 degrees F, +/- 50 degrees F).

C. Heat-Strengthened and Fully Tempered Float Glass: ASTM C1048, Kind HS (heat strengthened) and Kind FT (fully tempered), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Bow and Warpage Tolerance: 25 percent less than ASTM C 1048.
2. Distortion Limits: Calculated using LiteSentry Osprey Distortion + Flatness Inspection System for Glass and Plastic.
    a. Peak-to-Valley Roll Wave:
        1) Peak-to-Valley Distance:

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a) No dimension greater than 0.005 inch, with an average not to exceed 0.003 inch, central area.
b) No dimension greater than 0.008 inch within 250 mm of the leading and trailing edge.

b. Optical Roll Wave: For clear and Low iron glass 1/4 inch to 3/8 inch thick without ceramic frit or ink, maximum plus or minus 100 mD (millidiopter) over 95 percent of the glass surface.

3. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
4. Kind HS glass greater than 1/4 inch in thickness shall meet strength requirements in accordance with ASTM C 1048.

D. Reflective-Coated Vision Glass (Low-E): ASTM C1376.

2.05 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
1. Sealing System: Dual seals.
2. Perimeter Spacer: Provide manufacturer's standard spacer material and construction as required to meet Performance Requirements in Division 08 door, window, and framing assembly sections scheduled to receive insulating glass glazing.
a. Provide from one of the following:
1) Aluminum with mill or clear anodic finish.
2) Stainless steel.
3) Polypropylene-covered stainless steel in color selected by Architect.
4) Nonmetallic laminate.
b. Color: As selected by Architect from manufacturer's full range.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

2.06 GLAZING SEALANTS

A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class as recommended by manufacturer. Use NT.

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2.07 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks, Spacers, and Edge Blocks:
1. Type recommended by sealant or glass manufacturer with a Shore A durometer hardness of 85, plus or minus 5.

C. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.08 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

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3.03 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.04 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

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D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.05 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.06 GLASS GLAZING SCHEDULE

A. GL-1: Monolithic, fully tempered float glass.
1. Glass: Clear float glass.
2. Minimum Thickness: 6 mm.

B. GL-2: Low-E-coated, clear insulating glass.
1. Overall Unit Thickness: 1 inch (25 mm).
2. Minimum Thickness of Each Glass Lite: 6 mm.
3. Outdoor Lite: Heat-strengthened or Fully tempered as indicated, float glass.
4. Interspace Content: Air.
5. Indoor Lite: Heat-strengthened or Fully tempered as indicated, float glass.
6. Low-E Coating:
   a. Basis-of-Design Product: Vitro; Solarban 70.
   b. Location: Sputtered on second surface.

END OF SECTION

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SECTION 08 87 00 - GLAZING SURFACE FILMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Surface-applied glazing films.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show location and extent of film type. Use same designations indicated on Drawings.

C. Samples: Of each film specified.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of glazing film to include in maintenance manuals.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed 5 projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.05 FIELD CONDITIONS

A. Lighting: Do not install glazing film until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive glazing film.

B. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the glazing film manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.01 GLAZING SURFACE FILMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. 3M.
   2. Avery Dennison Graphics.
   3. Decorative Films, LLC.
   4. Eastman Performance Films, LLC.

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5. FDC Graphic Films, Inc.

2.02 ACCESSORIES

A. Provide accessories and tools recommended by manufacturer for project installation conditions.

PART 3 - EXECUTION

3.01 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

3.02 INSTALLATION, GENERAL

A. General: Comply with glazing film manufacturer's written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Install glazing film with no gaps or overlaps. Make butt splices, if necessary, using straightedge and sharp knife.

3.03 CLEANING

A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended by glazing film manufacturer.

3.04 PROTECTION

A. Attach signs to head of window frame or other conspicuous location reading, "Glazing Film Applied. Do Not Wash. Do not wash these windows or remove this notice until (insert date 30 days after installation)."

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SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Interior gypsum board.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.
   2. Section 07 92 00 "Joint Sealants" for acoustical sealants installed as part of STC-rated gypsum board assemblies.
   3. Section 09 30 00 "Tiling" for backer units installed as substrates for tile.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives, indicating VOC content.

1.04 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.

1.05 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

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PART 2 - PRODUCTS

2.01 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. American Gypsum.
   2. CertainTeed Corp.
   3. Georgia-Pacific Gypsum LLC.
   4. Continental Building Products.
   5. National Gypsum Company.
   6. PABCO Gypsum.
   7. USG Corporation.

2.02 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:
      a. VOC content limits for field applications.
   2. Ceiling Products:
      a. VOC emissions testing or certification.

2.03 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 E119 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 E90 and classified according to ASTM E413 by an independent testing agency.

2.04 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C1396/C1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

2.05 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.
   1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
   2. Shapes:

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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.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: As selected by Architect from manufacturer's standard.

2.06 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:
1. Interior Gypsum Board: Paper or self-adhering glass mesh.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose 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.

2.07 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

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PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

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.

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G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.03 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Type X: As indicated on Drawings.
   2. Ceiling Type: As indicated on Drawings.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing) horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
   3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

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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.

3.04 INSTALLATION OF 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 at locations indicated on Drawings and if not indicated, according to ASTM C840 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 at outside corners.
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.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.05 INSTALLATION OF PARTITION CLOSURES

A. General: Attach end wall cap extrusions to framing with same fasteners used for gypsum panels. Install partition closure assemblies according to manufacturer's written instructions.

3.06 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.

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2. Level 4: Surfaces scheduled for light-textured finishes, wallcoverings, flat paints and panel surfaces that will be exposed to view, unless otherwise indicated .
   a. Primer and its application to surfaces are specified in other Division 09 Sections.

3.07 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

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SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Acoustical panels and exposed suspension systems for interior ceilings.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
   1. Acoustical Panels: Set of 6-inch- square Samples of each type, color, pattern, and texture.
   2. Exposed Suspension-System Members, Moldings, and Trim: Set of long Samples of each type, finish, and color.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for ceiling products, indicating compliance with emissions testing or certification.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Ceiling suspension-system members.
   2. Structural members to which suspension systems will be attached.
   3. Method of attaching hangers to building structure.
      a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
   4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
   5. Size and location of initial access modules for acoustical panels.
   6. Items penetrating finished ceiling and ceiling-mounted items including the following:
      a. Lighting fixtures.
      b. Diffusers.
      c. Grilles.
      d. Speakers.

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e. Sprinklers.
f. Access panels.
g. Perimeter moldings.
h. .

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.06 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated or comparable product by one of the following:
1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. Rockfon (Rockwool International).
4. USG Corporation.

B. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.02 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
1. Ceiling Products:

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a. VOC emissions testing or certification.

2.03 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: Class A according to ASTM E1264.
2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.04 ACOUSTICAL PANELS

A. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264.

B. Basis-of-Design Product: As indicated on Drawings.

2.05 METAL SUSPENSION SYSTEM

A. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.
1. Structural Classification: Heavy-duty system.

B. Metal Suspension System:
1. Basis-of-Design Product: As indicated on Drawings.

2.06 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.

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C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

F. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

H. Seismic Struts: Compression struts designed to accommodate seismic forces.

I. Seismic Perimeter Retention System:
   1. Seismic Wall Molding: 2-inch molding.
   2. Seismic Perimeter Clips: Manufacturer's standard clips designed to accommodate seismic forces.
      a. Basis-of-Design Product: Subject to compliance with requirements, provide the following:
         1) Armstrong World Industries, Inc; BERC Series.
         2) USG Corporation; ACM7 Seismic Clip.
      b. Molding Profile: Manufacturer's standard 7/8-inch-wide profile, as selected by Architect.

2.07 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
   1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
   2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

B. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
   1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

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2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.08 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.03 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.
1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

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3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim, except where indicated on Drawings.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

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F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
   1. Arrange directionally patterned acoustical panels as follows:
      a. As indicated on reflected ceiling plans.
   2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
   3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
   4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
   5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
   6. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
   7. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.04 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Acoustical tiles.
   2. Metal edge moldings and trim.

B. Related Requirements:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data:
   1. Acoustical tiles.
   2. Metal edge moldings and trim.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
   1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
   2. Exposed Moldings and Trim: Set of 6-inch- long Samples of each type and color.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives, indicating VOC content.
   2. Documentation for acoustical ceiling tiles, indicating compliance with emissions testing or certification.
   3. Documentation for recycled content of acoustical ceiling tiles, indicating postconsumer and preconsumer recycled content and cost.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Ceiling suspension-system members.
   2. Structural members to which suspension systems will be attached.
   3. Method of attaching hangers to building structure.
      a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
   4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
   5. Size and location of initial access modules for acoustical tile.

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6. Items penetrating finished ceiling and ceiling-mounted items including the following:
   a. Lighting fixtures.
   b. Diffusers.
   c. Grilles.
   d. Speakers.
   e. Sprinklers.
   f. Access panels.
   g. Perimeter moldings.
7. Show operation of hinged and sliding components adjacent to acoustical tiles.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.06 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
   1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated or comparable product by one of the following:
   1. Armstrong World Industries, Inc.
   2. CertainTeed Corporation.
   3. Rockfon (Rockwool International).
   4. USG Corporation.

B. Source Limitations:

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1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.02 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:
      a. VOC content limits for field applications.
   2. Ceiling Products:
      a. Architect anticipates that compliance or Compliance with sustainable design criteria for material sourcing will require the following:
         1) Acoustical Ceiling Tiles: Minimum 60 percent total recycled content.

2.03 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: Class A in accordance with ASTM E1264.
   2. Smoke-Developed Index: 50 or less.

B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.04 ACOUSTICAL TILES

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264.

B. Basis-of-Design Product: As indicated on Drawings.

C. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1. Insert manufacturer's name; product name or designation.
      a. Modular Size: As indicated on Drawings.
      b. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested in accordance with ASTM D3273, ASTM D3274, or ASTM G21 and evaluated in accordance with ASTM D3274 or ASTM G21.

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2.05 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. Fry Reglet Corporation.
4. Gordon, Inc.
5. Rockfon (Rockwool International).
6. USG Corporation.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.06 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 07 92 00 "Joint Sealants."

2.07 MISCELLANEOUS MATERIALS

A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.

B. Staples: 5/16-inch- long, divergent-point staples.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

C. Layout openings for penetrations centered on the penetrating items.

3.03 INSTALLATION OF DIRECTLY ATTACHED ACOUSTICAL TILE CEILINGS

A. Adhesive Installation: Install acoustical tile by bonding to substrate, using acoustical tile adhesive and procedure recommended in writing by tile manufacturer and as follows:
1. Wipe and prime ceiling.
2. Remove loose dust from backs of tiles by brushing.
3. Install splines in joints between tiles and maintain bottom surface to a uniform level. Shim tile or correct substrate as required to maintain levelness.
4. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.

B. Stapled Installation: Fasten acoustical tile to substrate using a minimum of two staples per tile that are installed in flanges of tile and as follows:
1. Form double-lapped joint between tiles by securely pressing tile tongues into corresponding tile grooves.
2. Maintain bottom surface of tiles to a uniform level. Shim tile or correct substrate as required to maintain levelness.
3. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.

D. Arrange directionally patterned acoustical tiles as indicated on Drawings.

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3.04 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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SECTION 09 65 00 - RESILIENT FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Resilient sheet flooring.
   2. Resilient tile flooring.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.
   2. Section 09 65 13 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.
   3. Section 09 65 36 "Static-Control Resilient Flooring" for resilient floor coverings designed to control electrostatic discharge.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient flooring.
   1. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   2. Show details of special patterns.

C. Samples for Verification: For each type of resilient flooring, in manufacturer's standard size, but not less than 6-by-9-inch sections of each color, texture, and pattern required.

D. Product Schedule: For resilient flooring. Use same designations indicated on Drawings.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives , indicating VOC content.
   2. Documentation for flooring products, indicating compliance with emissions testing or certification.

B. Product Test Reports:
   1. Slip-resistance test reports from qualified independent testing agency.

C. Qualification Data: For Installer.

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1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient flooring to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for resilient flooring installation and seaming method indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by resilient flooring manufacturer for installation techniques required.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store resilient flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive resilient flooring during the following periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during resilient flooring installation.

D. Close spaces to traffic for 48 hours after resilient flooring installation.

E. Install resilient flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:

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a. VOC content limits for field applications.
2. Sealants:
a. VOC content limits for field applications.
3. Flooring Products:
a. VOC emissions testing or certification.

2.02 PERFORMANCE REQUIREMENTS

A. Slip Resistance, Coefficient of Friction: Provide flooring with the following values as determined by testing identical products in accordance with the following:
1. Level Surfaces, Dry and Wet: DCOF of not less than 0.42 in accordance with ANSI A326.3.

B. Fire-Test-Response Characteristics: For resilient flooring, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.03 RESILIENT SHEET FLOORING

A. Unbacked Vinyl Sheet Flooring:
1. Basis-of-Design Product: As indicated on Drawings.
2. Product Standard: ASTM F1913.
3. Sheet Width: As standard with manufacturer.
4. Seamless-Installation Method: Heat welded.
5. Colors and Patterns: As indicated by manufacturer's designations on drawings.

2.04 RESILIENT TILE FLOORING

A. Solid Vinyl Floor Tile:
1. Basis-of-Design Product: As indicated on Drawings.
2. Colors and Patterns: As indicated by manufacturer's designations on Drawings.

B. Vinyl Composition Floor Tile:
1. Basis-of-Design Product: As indicated on Drawings.
2. Colors and Patterns: As indicated by manufacturer's designations on
3. Drawings.

2.05 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient flooring and substrate conditions indicated.

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C. High Performance Adhesives: Type recommended by manufacturer where heavy static or rolling loads exist.

D. Seamless-Installation Accessories:
   1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
      a. Colors: As selected by Architect from manufacturer's full range to contrast with flooring.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare substrates according to resilient flooring manufacturer's written instructions to ensure adhesion of resilient flooring.

B. Concrete Substrates: Prepare according to ASTM F710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient flooring manufacturer. Do not use solvents.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient flooring until materials are the same temperature as space where they are to be installed.
   1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient flooring.

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3.03 RESILIENT FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient flooring.

B. Unroll resilient flooring and allow it to stabilize before cutting and fitting.

C. Lay out resilient flooring as follows:
   1. Maintain uniformity of flooring direction.
   2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
   3. Match edges of flooring for color shading at seams.
   4. Avoid cross seams.

D. Scribe and cut resilient flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend resilient flooring into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient flooring as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install resilient flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

H. Adhere resilient flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:
   1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
   2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to fuse sections permanently into a seamless flooring installation. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

J. Integral-Flash-Cove Base: Cove resilient flooring 6 inches up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt at top against cap strip.
   1. Install metal corners at inside and outside corners.

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3.04 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Seamless Installation:
   1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

3.05 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient flooring.

B. Perform the following operations immediately after completing resilient flooring installation:
   1. Remove adhesive and other blemishes from surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

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C. Protect resilient flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.

E. Cover resilient flooring until Substantial Completion.

END OF SECTION

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SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Resilient base.
   2. Resilient molding accessories.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives, indicating VOC content.
   2. Documentation for resilient base, indicating compliance with emissions testing or certification.

B. Product Test Reports:
   1. Slip-resistance test reports from qualified independent testing agency.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.05 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

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B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:
      a. VOC content limits for field applications.
   2. Resilient Base:
      a. VOC emissions testing or certification.

2.02 RESILIENT BASE

A. Product Standard: As follows:
   1. ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

B. Style and Location: As indicated on darwings.

C. Thickness: 0.125 inch.

D. Height: As indicated on Drawings.

E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors: As indicated by manufacturer's designations on Drawings .

2.03 MOLDING ACCESSORIES

A. Description: Provide rubber molding accessories as follows:
   1. As indicated on drawings.

B. Profile and Dimensions: As indicated.

C. Colors and Patterns: As indicated by manufacturer's designations on Drawings.

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2.04 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
   1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.03 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

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C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
      a. Form without producing discoloration (whitening) at bends.
   2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
      a. Miter or cope corners to minimize open joints.

END OF SECTION

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SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Modular carpet tile.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.
   2. Section 02 41 19 "Selective Demolition" for removing existing floor coverings.
   3. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
   2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:
   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
   2. Carpet tile type, color, and dye lot.
   3. Type of subfloor.
   4. Type of installation.
   5. Pattern of installation.
   6. Pattern type, location, and direction.
   7. Pile direction.
   8. Type, color, and location of insets and borders.
   9. Type, color, and location of edge, transition, and other accessory strips.
   10. Transition details to other flooring materials.

C. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives, indicating VOC content.
   2. Documentation for flooring products, indicating compliance with emissions testing or certification.

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3. Documentation for recycled content of nylon carpet, indicating postconsumer and preconsumer recycled content and cost.

B. Qualification Data: For Installer.

C. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

D. Sample Warranty: For special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

1.07 FIELD CONDITIONS

A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

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1.08 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
   1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
   2. Failures include, but are not limited to, the following:
      a. More than 10 percent edge raveling, snags, and runs.
      b. Dimensional instability.
      c. Excess static discharge.
      d. Loss of tuft-bind strength.
      e. Loss of face fiber.
      f. Delamination.
   3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:
      a. VOC content limits for field applications.
   2. Flooring Products:
      a. VOC emissions testing or certification.

2.02 CARPET TILE

A. Products: As indicated on drawings.

B. Performance Characteristics:
   1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
   2. Optical Smoke Density Rating: Does not exceed 450 according to ASTM E662.
   3. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.

2.03 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

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B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
   1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
      c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

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C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.03 INSTALLATION

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

3.04 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:
1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

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SECTION 09 84 36 - SOUND-ABSORBING CEILING UNITS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
   1. Sound-absorbing baffle panels.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include panel edge, core material, and mounting indicated.

B. Shop Drawings: For unit assembly and installation.
   1. Include reflected ceiling plans, elevations, sections, and mounting devices and details.
   2. Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate panel edge profile and core materials.
   3. Include direction of fabric weave and pattern matching.

C. Samples for Verification: For the following products:
   1. Baffle: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
   2. Mounting Devices: Full-size Samples.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for ceiling unit products, indicating compliance with emissions testing or certification.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturer's written cleaning and stain-removal instructions.

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1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.06 FIELD CONDITIONS

A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.

C. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Ceiling Unit Products:
      a. VOC emissions testing or certification.

2.02 PERFORMANCE REQUIREMENTS

A. Seismic Criteria: Provide suspended sound-absorbing ceiling units designed and installed to withstand the effects of earthquake motions in accordance with ASCE/SEI 7 and requirements of authorities having jurisdiction.

B. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.

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2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.03 SOUND-ABSORBING CEILING UNITS

A. Sound-Absorbing Ceiling BafflePanel: Manufacturer's standard panel construction consisting of felt material configured and fabricated to form a self-supporting bafflelaminated to front face, edges, and back edge border of core or stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
a. Acoufelt.
b. CSI Creative.
c. Armstrong Ceiling & Wall Solutions.
d. Conwed.
e. Lamvin, Inc.
f. Sound Concepts.
g. Turf Design, Inc.
2. Panel Shape: As indicated on Drawings.

B. Sound-Absorbing Baffle Panel: Manufacturer's standard panel construction .
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings.
2. Panel Shape: As indicated on Drawings.
3. Mounting: Top-edge mounted with manufacturer's standard suspension system , secured to substrate.
4. Core: Manufacturer's standard .
5. Nominal Overall Panel Thickness: As indicated on Drawings.
6. Panel Width: As indicated on Drawings.
7. Panel Height: As indicated on Drawings.

2.04 FABRICATION

A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated, with facing material applied to face, edges, and back border of dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.

C. Edge Hardening: For glass-fiber board and mineral-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.

D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
1. Thickness.
2. Edge straightness.

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3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

3.03 INSTALLATION TOLERANCES

A. Variation from Alignment with Surfaces: Plus or minus 1/16 inch in 48 inches, noncumulative.

B. Variation from Level or Slope: Plus or minus 1/16 inch.

3.04 CLEANING

A. Clip loose threads; remove pills and extraneous materials.

B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

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SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Surface preparation and the application of paint systems on interior and exterior substrates.

B. Related Sections:
1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 DEFINITIONS

A. Sheen Levels:
1. Flat: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
2. Eggshell: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
3. Satin: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
4. Semi-Gloss: 35 to 70 units at 60 degrees, according to ASTM D523.
5. Gloss: 70 units and greater at 60 degrees, according to ASTM D523.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

1.04 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
1. Documentation for paints and coatings, indicating VOC content.

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PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 3 articles for the paint category indicated.

B. Source Limitations: Obtain products for each coating system from single source from single manufacturer.

2.02 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Paints and Coatings:
      a. VOC content limits for field applications.

2.03 PAINT PRODUCTS, GENERAL

A. Material Compatibility:
   1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As indicated in a color schedule.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Fiber-Cement Board: 12 percent.
   3. Masonry (Clay and CMUs): 12 percent.
   4. Wood: 15 percent.
   5. Gypsum Board: 12 percent.
   6. Plaster: 12 percent.

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C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates:
   1. Metal Substrates Galvanized in Accordance with ASTM A 123 and ASTM A 153: Prepare substrates in accordance with ASTM D 6386.

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2. Other Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.03 INSTALLATION

A. Apply paints according to manufacturer's written instructions.
1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.

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h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
i. .

2. Paint the following work where exposed in occupied spaces:
   a. Equipment, including panelboards.
   b. Uninsulated metal piping.
   c. Uninsulated plastic piping.
   d. Pipe hangers and supports.
   e. Metal conduit.
   f. Plastic conduit.
   g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   h. Other items as directed by Architect.
   i. .
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.04 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.05 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 INTERIOR PAINTING SCHEDULE

A. Gypsum Board; Acrylic Latex: Provide one of the following systems:
   1. Benjamin Moore:
      a. Primer: Ultra Spec 500 Interior Latex Primer.
      b. Intermediate Coat: Same as top coat.
      c. Top Coat: Ultra Spec 500 Interior.
      d. Sheen:
         1) Walls: Eggshell, unless indicated otherwise.
         2) Ceilings: Flat, unless indicated otherwise.
   2. Sherwin Williams:

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a. Primer: ProMar 200 Zero VOC Interior Latex Primer B28 Series.
b. Intermediate Coat: Same as top coat.
c. Top Coat: ProMar 200 Zero VOC Interior Latex.
d. Sheen:
1) Walls: Eggshell, unless indicated otherwise.
2) Ceilings: Flat, unless indicated otherwise.

3. PPG:
a. Primer: Speedhide ZERO VOC Interior Latex Primer.
b. Intermediate Coat: Same as top coat.
c. Top Coat: Speedhide ZERO VOC Interior Latex.
d. Sheen:
1) Walls: Eggshell, unless indicated otherwise.
2) Ceilings: Flat, unless indicated otherwise.

4. Dunn-Edwards:
a. Primer: Vinylastic Premium.
b. Intermediate Coat: Same as topcoat.
c. Top Coat: Everest.
d. Sheen: Eggshell.

B. Wood Trim, Wood Doors, Wood Frames and Other Interior Wood and Wood-Based Items as Indicated; Acrylic Latex. Provide one of the following systems:
1. Benjamin Moore:
a. Primer: Ultra Spec 500 Interior Latex Primer.
b. Intermediate Coat: Same as top coat.
c. Top Coat: Advance Waterborne Interior Alkyd.
d. Sheen: Semi-gloss, unless indicated otherwise.

2. Sherwin Williams:
a. Primer: S-W PrepRite Multi-Purpose Latex Primer.
b. Intermediate Coat: Same as top coat.
c. Top Coat: Promar 200 WB Acrylic Alkyd.
d. Sheen: Semi-gloss, unless indicated otherwise.

3. PPG:
a. Primer: Speedhide Interior Sealer Quick Drying 6-2.
b. Intermediate Coat: Same as top coat.
c. Top Coat: Speedhide Int/Ext Water Borne Alkyd.
d. Sheen: Semi-gloss, unless indicated otherwise.

4. Dunn-Edwards:
a. Primer: Ultra-Grip Premium.
b. Intermediate Coat: Same as topcoat.
c. Top Coat: Aristoshield.
d. Sheen: Semi-gloss, unless indicated otherwise.

C. Ferrous and Non Ferrous Metals Including: Exposed metal fabrications, steel doors, steel door frames, grilles, panels, stairs, railings, and other miscellaneous metal items indicated; Direct to Metal Acrylic. Provide one of the following systems:
1. Rustoleum Sierra Performance:

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a. Primer: S-37 System Metalmax DTM Acrylic Urethane.
b. Intermediate Coat: None required.
c. Top Coat: Same as Primer.
d. Sheen: Semi-gloss, unless indicated otherwise.

2. Sherwin Williams:
   a. Primer: Pro Industrial ProCryl Primer B66-1300.
   b. Intermediate Coat: None required.
   c. Top Coat: Pro Industrial Acrylic B66-1151 Series.
   d. Sheen: Semi-gloss, unless indicated otherwise.
3. PPG:
   a. Primer: Pitt-Tech Plus EP PRIMER Int/Ext Rust Inhibitive Primer.
   b. Intermediate Coat: None required.
   c. Top Coat: 90-1610 Pitt-Tech Plus EP DTM Light Industrial.
   d. Sheen: Semi-gloss, unless indicated otherwise.
4. Dunn-Edwards:
   a. Primer:
      1) Ferrous Metals: Enduraprime Metal Primer.
      2) Non-Ferrous Metals and Galvanized Steel: Ultrashield Galvanized Metal Primer.
   b. Intermediate Coat: Same as topcoat.
   c. Top Coat: Endura-Coat.
   d. Sheen: Semi-gloss, unless indicated otherwise.

D. Mechanical And Electric Equipment Items: Insulated Piping Galvanized Ducts, Piping, Conduits, etc.; Ferrous Piping, Hangers (and like items);Electric Panels; and as indicated. Provide one of the following systems:
   1. Tnemec:
      a. One Coat: Uni-Bond DF Series 115; 3.0 DFM.
      b. Color: White.
   2. PPG:
      a. One Coat: Speedhide Super Tech Interior Dry Fog Flat 6-723XI.
      b. Color: White.

END OF SECTION

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SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Wood stains.
   2. Transparent finishes.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data:
   1. For each type of product.
   2. Include preparation requirements and application instructions.
   3. Indicate VOC content.

B. Samples for Verification: Sample for each type of finish system and in each color and gloss of finish required on representative samples of actual wood substrates.
   1. Size: 8 inches square or 8 inches long.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

C. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for paints and coatings, indicating VOC content.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

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1.05 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures of less than 5 deg F above the dew point, or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
1. Paints and Coatings:
a. VOC content limits for field applications.

2.02 MATERIALS, GENERAL

A. Material Compatibility:
1. Provide materials for use within each coating 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.

B. Stain Colors: As indicated in a color schedule.

2.03 WOOD STAINS

A. Stain, Interior, Transparent, for Interior Wood: Water-based, transparent, penetrating stain for new interior wood surfaces that are to be finished with a clear varnish.
1. Purity Stain; Penetrating Stain.

2.04 TRANSPARENT FINISHES

A. Varnish, Interior, Water Based, Clear, Satin: Water-based clear satin coating for interior wood trim, frames, doors, paneling and cabinetry.
1. Sansin Purity Glacier; Crystal-Clear Finish.
2. Gloss and Sheen Level: Gloss of 20 to 35 units at 60 degrees and minimum sheen of 35 units at 85 degrees when tested in accordance with ASTM D523.

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PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Interior Wood Substrates: 10 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes .

D. Proceed with finish application only after unsatisfactory conditions have been corrected.
   1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

A. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
   1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

B. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
   1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
   2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

C. Interior Wood Substrates:
   1. Apply wood filler paste to open-grain woods to produce smooth, glasslike finish.
   2. Sand surfaces exposed to view and dust off.

3.03 APPLICATION

A. Apply finishes according to manufacturer's written instructions.
   1. Use applicators and techniques suited for finish and substrate indicated.
   2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.

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3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.04 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.05 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Wood Substrates, Wood Trim Doors :
1. Water-Based Varnish System:
a. Prime Coat: Water-based varnish matching topcoat.
b. Intermediate Coat: Water-based varnish matching topcoat.
c. Topcoat: Varnish, water based, clear, satin.

END OF SECTION

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SECTION 10 11 00 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Markerboards.

1.02 SUBMITTALS

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

B. Sustainable Design Submittals:
   1. Product Data: For installation adhesives, indicating VOC content.

C. Samples: For each exposed product and for each color and texture specified.

D. Qualification Data: For qualified Installer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.

F. Operation and Maintenance Data: For visual display surfaces to include in maintenance manuals.

G. Warranties: Sample of special warranties.

1.03 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Surfaces lose original writing and erasing qualities.
      b. Surfaces exhibit crazing, cracking, or flaking.
   2. Warranty Period: 50 years from date of Substantial Completion.

1.04 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

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B. Lighting: Do not install wall covering until a permanent level of lighting is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Glass markerboard assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the glass markerboard assemblies will remain in place without separation of any parts when subjected to the seismic forces specified."

2.02 MATERIALS, GENERAL

A. Porcelain-Enamel Face Sheet: Porcelain-enamel-clad, ASTM A 463/A 463M, Type 1, stretcher-leveled aluminized steel, with 0.024-inch uncoated thickness; with porcelain-enamel coating fused to steel at approximately 1000 deg F.
   1. Products: Subject to compliance with requirements, provide the following: .
      a. Claridge Products and Equipment, Inc.; LCS Markerboard.

B. Melamine: Thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

C. High-Pressure Plastic Laminate: NEMA LD 3.

D. Hardboard: ANSI A135.4, tempered.

E. Particleboard: ANSI A208.1, Grade M-1.

F. Fiberboard: ASTM C 208.

G. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.03 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer.

B. Primer/Sealer: Mildew resistant, complying with requirements in Division 09 Section "Painting " and recommended in writing by wall-covering manufacturer for intended substrate.

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2.04 MARKERBOARD ASSEMBLIES

A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and 0.021-inch- thick, porcelain-enamel face sheet with low-gloss finish.
   1. Claridge LCS Deluxe Markerboard BOD
   2. Manufacturer's Standard Core: Minimum 1/4 inch thick, with manufacturer's standard moisture-barrier backing.
   3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

2.05 MARKERBOARD ACCESSORIES

A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; of size and shape indicated on Drawings.
   1. Factory-Applied Trim: Manufacturer's standard.

B. Chalktray: Manufacturer's standard, continuous.
   1. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.

C. Map Rail: Provide the following accessories:
   1. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches wide.
   2. End Stops: Located at each end of map rail.
   3. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches of map rail or fraction thereof.
   4. Flag Holder: Two for each room.

2.06 FABRICATION

A. Visual Display Boards: Factory assemble visual display boards unless otherwise indicated.
   1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.

B. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
   1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.07 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

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PART 3 - EXECUTION

3.01 INSTALLATION

A. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.

B. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

C. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.
   1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.
      a. Attach chalktrays to boards with fasteners at not more than 12 inches o.c.

D. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room. Cover and protect visual display surfaces.

END OF SECTION

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SECTION 10 11 43 - VISUAL DISPLAY WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes shop-fabricated, visual display wall panels of the following types:.
   1. Tackable wall panels.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

C. Shop Drawings: For panel assembly and installation.

D. Samples: For each exposed product and for each color and texture specified.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Panels are to comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.02 VISUAL DISPLAY WALL PANELS

A. Tackable Wall Panel: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Chatfield Clarke Floor-to-Ceiling Tackboard Panels.

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2. Mounting:
   a. Back mounted with manufacturer's standard adhesive , secured to substrate.
3. Core: Manufacturer's standard .
   a. Core-Face Layer: Manufacturer's standard tackable, impact-resistant, high-density board.
4. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
5. Edge Profile: Square.
6. Corner Detail in Elevation: Square Custom as indicated on Drawings with continuous edge profile indicated.
7. Reveals between Panels: reveals As indicated on Drawings.
8. Facing Material: As indicated on Drawings.
9. Nominal Core Thickness: 1-1/2 inches.

2.03 MATERIALS

A. Vinyl Fabric: Mildew resistant, washable, complying with ASTM F793/F793M, Type II, burlap weave; weighing not less than 13 oz./sq. yd.; with surface-burning characteristics indicated.

B. Core Materials: Manufacturer's standard.
1. Tackable, Impact-Resistant, High-Density Board for Face Layer: 1/8-inch- thick layer of compressed, molded glass-fiber board with a nominal density of 16 to 18 lb/cu. ft. laminated to face of core.
2. Impact-Resistant, Copolymer Sheet for Face Layer: 1/16- to 1/8-inch- thick layer of perforated, noncombustible, copolymer sheet laminated to face of core.

C. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.

2.04 FABRICATION

A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Tackable Wall Panels:
1. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
2. Facing Material and Lining Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

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a. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent panels.

3. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Tackboard Wall Panels: Attach panels to wall surface with adhesive gobs at 16 inches o.c., horizontally and vertically.
1. Install wrapped-edge panels with butt joints between adjacent wall panels.

C. Comply with manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.

D. Align fabric pattern and grain with adjacent panels.

3.02 CLEANING

A. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

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SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Panel signs.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For signs.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
   3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.

C. Samples: For each exposed product and for each color and texture specified.

D. Product Schedule: For signs. Use same designations indicated on Drawings or specified.

E. Design Data Submittal: For [signs indicated in "Performance Requirements" Article] <Insert sign designations>.
   1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives, indicating VOC content.

B. Sample Warranty: For special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

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1.05 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:
      a. VOC content limits for field applications.

2.02 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design sign structure and anchorage of panel sign type(s) according to structural performance requirements.

B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.

C. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and California Building Code, Chapter 11.

2.03 PANEL SIGNS

A. Plastic Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
   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. ACE Sign Systems, Inc.
      b. Advance Corporation.
      c. Allen Industries Architectural Signage.
      d. Allen Markings.
      e. APCO Graphics, Inc.
      f. ASE, Inc.
      g. ASI Sign Systems, Inc.

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h. Best Sign Systems, Inc.
i. Bunting Graphics, Inc.
j. Clarke Systems.
k. Cosco.
l. Diskey Architectural Signage Inc.
m. Fossil Industries, Inc.
n. Inpro Corporation.
o. Mohawk Sign Systems.
p. Nelson-Harkins Industries.
q. Poblocki Sign Company, LLC.
r. Seton Identification Products; a Brady Corporation company.
s. Signs & Decal Corp.
t. Stamprite Supersine; a division of Stamp Rite Inc.
u. Vista System.
v. Vomar Products, Inc.

2. Sign Material: As indicated on Drawings .
3. Sign-Panel Perimeter: Finish edges smooth.
   a. Edge Condition: As indicated on Drawings.
   b. Corner Condition in Elevation: As indicated on Drawings .
4. Mounting: As indicated on Drawings .
5. Surface Finish and Applied Graphics:
   a. Integral Acrylic Sheet Color: As selected by Architect from full range of industry colors.

2.04 SIGN MATERIALS

A. Acrylic Sheet: ASTM D4802, Type UVF (UV filtering).

B. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.

2.05 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
   1. Use tamper proof concealed fasteners and anchors unless indicated to be exposed.
   2. For exterior exposure, furnish stainless-steel or hot-dip galvanized devices unless otherwise indicated.

B. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 and ICC-ES AC58 as appropriate for the substrate.

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1. Uses: Securing signs with imposed loads to structure.
2. Type: Torque-controlled, expansion anchor or torque-controlled, adhesive anchor or adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

C. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Adhesive: As recommended by sign manufacturer.

E. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

G. Anchoring Materials:
1. 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.
2. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
    a. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.06 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

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6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into indicated sign surface to produce precisely formed copy, incised to uniform depth.
1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.
2. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.
3. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with manufacturer's standard enamel. Apply manufacturer's standard opaque background color coating to back face of acrylic sheet.
4. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.

C. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

D. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

E. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Accessible Signage: Install in locations on walls as indicated on Drawings .

C. Mounting Methods:

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1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
   a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
   b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
   a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
   b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
4. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

D. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION

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SECTION 10 22 53 - HANGING SCREENS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Hanging fabric screens.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show sizes, locations, and details of installation including attachment to adjacent construction.

C. Samples for Verification: For each type of screen and for each color, pattern, texture, and finish specified, full width by 36 inches long in size.

1.03 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each hanging screen showing compliance with fire-test-response requirements.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For products installed to include in maintenance manuals.

1.05 FIELD CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Scheduling: Do not deliver or install screens until after other finish work, including painting, is complete and spaces are otherwise ready for occupancy.

PART 2 - PRODUCTS

2.01 HANGING FABRIC SCREENS

A. Basis-of-Design Product:
   1. Turf; an Armstrong World Industries brand.

B. Source Limitations: Obtain each color and pattern of fabric screen from one dye lot.

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C. Fire-Test-Response Characteristics: For hanging fabric screens, provide products that comply with provisions set forth in California Code of Regulations (CCR), Title 19, Division 1, Chapter 8.

D. Fabric Screen: Polyester felt screen as follows
   1. Thickness: 9 mm.
   2. Color: As selected by Architect from manufacturer's full range.
   3. Pattern: Custom as indicated on Drawings.
   4. Installation Method: As indicated on Drawings.

PART 3 - EXECUTION

3.01 SCREEN INSTALLATION

A. Install mounting systems according to manufacturer's written instructions, level and plumb, and at height and location in relation to adjacent construction as indicated on Drawings.

B. Isolate metal parts of tracks and brackets from concrete, masonry, and mortar to prevent galvanic action. Use tape or another method recommended in writing by manufacturer.

C. Hang fabric screens according to manufacturer's written instructions and as indicated on Drawings.

3.02 ADJUSTING

A. Steam and dress down screens as required to produce crease- and wrinkle-free installation.

B. Remove and replace screens that are stained or soiled.

END OF SECTION

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SECTION 10 26 00 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Corner guards.
   2. Impact-resistant wall coverings.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For each type of wall and door protection showing locations and extent.

C. Samples: For each exposed product and for each color and texture specified, 12 inches long.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives, indicating VOC content.

B. Sample Warranty: For special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
   1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

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1.05 DELIVERY, STORAGE, AND HANDLING

A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
   1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
   2. Keep plastic materials out of direct sunlight.
   3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
      a. Store corner-guard covers in a vertical position.

1.06 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
      b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain wall- and door-protection products of each type from single source from single manufacturer.

2.02 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
   1. Adhesives:
      a. VOC content limits for field applications.

2.03 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing 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.

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2.04 CORNER GUARDS

A. Surface-Mounted, Opaque-Plastic Corner Guards: Fabricated as one piece from PVC plastic; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
   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:
   2. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawingsor comparable products by one of the following:
      a. Construction Specialties, Inc.
      b. Inpro Corporation.
      c. Koroseal Interior Products, LLC.
   3. Mounting: Adhesive.
   4. Color and Texture: As indicated by manufacturer's designations on drawings.

B. Surface-Mounted, Transparent-Plastic Corner Guards: Fabricated as one piece from clear polycarbonate plastic sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
   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:
   2. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawingsor comparable products by one of the following:
      a. Construction Specialties, Inc.
      b. Inpro Corporation.
      c. Koroseal Interior Products, LLC.
   3. Thickness: Minimum 0.075 inch.
   4. Mounting: Countersunk screws through factory-drilled mounting holes.

2.05 IMPACT-RESISTANT WALL COVERINGS

A. Impact-Resistant Sheet Wall Covering: Fabricated from semirigid, plastic sheet wall-covering material.
   1. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawingsor comparable products by one of the following:
      a. Construction Specialties, Inc.
      b. Inpro Corporation.
      c. Koroseal Interior Products, LLC.
   2. Sheet Thickness: 0.040 inch .
   3. Height: As indicated.
   4. Custom Graphic: As provided by Architect.
   5. Mounting: Adhesive.

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2.06 MATERIALS

A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D256, Test Method A.

C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

D. Adhesive: As recommended by protection product manufacturer.

2.07 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
   1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.

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B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.03 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

D. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

3.04 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

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SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Washroom accessories.
   2. Custodial accessories.

1.02 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.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
   1. Identify locations using room designations indicated.

1.04 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.06 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, visible silver spoilage defects.
   2. Warranty Period: 10 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.01 OWNER-FURNISHED MATERIALS

A. Owner-Furnished Materials:
   1. Soap dispenser.
   2. Paper towel dispenser.

2.02 PERFORMANCE REQUIREMENTS

A. 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.

2.03 WASHROOM ACCESSORIES

A. Basis-of-Design Product:
   1. Bobrick Washroom Equipment, Inc.

B. Toilet Tissue (Roll) Dispenser:
   1. Basis-of-Design Product: Bobrick; Multi-Roll Toilet Tissue Dispenser.
   2. Description: Double-roll dispenser.
   3. Mounting: Recessed.
   4. Operation: Noncontrol delivery with theft-resistant spindle.
   5. Capacity: Designed for 5-1/4-inch diameter tissue rolls.
   6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. Grab Bar:
   1. Basis-of-Design Product: Bobrick; Stainless Steel Grab Bars with Snap Flange.
   2. Mounting: Flanges with concealed fasteners.
   3. Material: Stainless steel, 0.05 inch thick.
      a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area.
   4. Outside Diameter: 1-1/2 inches.
   5. Configuration and Length: As indicated on Drawings .

D. Sanitary-Napkin Disposal Unit:
   1. Basis-of-Design Product: Bobrick; Surface-Mounted Sanitary Napkin Disposal.
   2. Mounting: Surface mounted.
   3. Door or Cover: Disposal-opening cover and hinged face panel .
   4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

E. Seat-Cover Dispenser:
   1. Basis-of-Design Product: Bobrick; Surface-Mounted Seat-Cover Dispenser.
   2. Mounting: Surface mounted.

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3. Minimum Capacity: 250 seat covers.
4. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

F. Mirror Unit:
1. Basis-of-Design Product: Bobrick; Mirror with Stainless Steel Channel Frame.
2. Frame: Stainless steel channel.
   a. Corners: Mitered.
3. Size: 18 x 30 inches.

2.04 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. AJW Architectural Products.
2. ASI-American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. Brey-Krause Manufacturing Co.
6. Gamco Commercial Restroom Accessories; Bobrick Washroom Equipment, Inc.
7. Tubular Specialties Manufacturing, Inc.

B. Custodial Utility Shelf:
1. Basis-of-Design Product: Bobrick; Utility Shelf with Mop/Broom Holders and Rag Hooks.
2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
3. Size: 34 inches long by 8 inches deep.
4. Material and Finish: Not less than nominal 0.05-inch- thick stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. Custodial Mop and Broom Holder:
1. Basis-of-Design Product: Bobrick; Utility Shelf with Mop/Broom Holders and Rag Hooks.
2. Description: Unit with shelf, hooks, and holders.
3. Length: 34 inches.
4. Hooks: Four.
5. Mop/Broom Holders: Three, 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 0.05-inch- thick stainless steel.

2.05 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.

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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

3.01 INSTALLATION

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

3.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION

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SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Fire-protection cabinets for the following:
      a. Portable fire extinguisher.

B. Related Sections:
   1. Division 21 Sections for fire-hose connections.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
   2. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.
   3. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

B. Shop Drawings: For fire-protection cabinets.
   1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches square.

D. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.04 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

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1.05 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.03 FIRE-PROTECTION CABINET

A. Basis-of-Design Product: Activar Construction Products Group Inc.; Cosmopolitan Stainless Steel Fire Extinguisher Cabinets.

B. Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: [Nonrated] [One-hour fire rated] [Two-hour fire rated].
   1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- thick cold-rolled steel sheet lined with minimum 5/8-inch- thick fire-barrier material. Provide factory-drilled mounting holes.

D. Cabinet Material: Stainless steel sheet.
   1. Shelf: Same metal and finish as cabinet.

E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
   1. Rolled-Edge Trim: [2-1/2-inch] [4-inch] [4-1/2-inch] <Insert dimension> backbend depth.

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F. Cabinet Trim Material: Stainless steel sheet.

G. Door Material: Stainless steel sheet.

H. Door Style: Solid opaque panel with frame.

I. Door Glazing: Tempered float glass (clear).

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide recessed door pull and friction latch.
   2. Provide continuous hinge, of same material and finish as trim,, permitting door to open 180 degrees.

K. Accessories:
   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
   3. Break-Glass Door Handle: Manufacturer's standard, integral to glass with the words "PULL TO BREAK GLASS" applied to handle.
   4. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
   5. Door Lock: [Cam lock that allows door to be opened during emergency by pulling sharply on door handle] [Cylinder lock, keyed alike to other cabinets].
   6. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated .
      a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
         1) Location: Applied to cabinet door.
         2) Application Process: Pressure-sensitive vinyl letters.
         3) Lettering Color: Red.
         4) Orientation: Vertical.

L. Materials:
   1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.
      a. Finish: ASTM A480/A480M No. 4 directional satin finish, .
   2. Clear Float Glass: ASTM C1036, Type I, Class 1, Quality q3, [**3**] [**6**] mm thick.
   3. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).
   4. Break Glass: Clear annealed float glass, ASTM C1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.
   5. Tempered Break Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

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6. Wire Glass: ASTM C1036, Type II, Class 1, Form 1, Quality q8, Mesh m1 (diamond), 6 mm thick.

2.04 SECURITY FIRE-PROTECTION CABINET

A. Basis-of-Design Product: Activar Construction Products Group Inc.; Cosmopolitan Stainless Steel Fire Extinguisher Cabinets.

B. Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: Nonrated.

D. Cabinet Material: [0.078-inch- thick stainless steel sheet.
1. Shelf: Same metal and finish as cabinet.

E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

F. Cabinet Trim Material: Stainless steel sheet.

G. Door Material: 0.078-inch- thick stainless steel sheet.

H. Door Style: Solid opaque panel with frame.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated, and as follows:
1. Continuous Hinge: Same material and finish as trim, permitting door to open 180 degrees.
2. Mechanical Deadlock: Lockbolt retracted and extended by five-tumbler [**paracentric**] [**mogul**] cylinder; keyed one side.
a. Lockbolt: 1-1/2 inches high by 3/4 inch thick; 5/8-inch throw.
3. Mechanical Snaplatch: Automatic snaplatch when closed; latchbolt retracted by five-tumbler [**paracentric**] [**mogul**] cylinder; keyed one side.
a. Lockbolt: 1 inch high by 7/16 inch thick; 5/16-inch throw.
4. Mechanical Snaplatch: As specified in Section 08 71 63 "Detention Door Hardware."

J. Accessories:
1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to security fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
a. Identify fire extinguisher in security fire-protection cabinet with the words "FIRE EXTINGUISHER."

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1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Red.
4) Orientation: Vertical.

3. Keys: Three per door lock.

K. Materials:
1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.
a. Finish: ASTM A480/A480M No. 4 directional satin finish .

2.05 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
1. Weld joints and grind smooth.
2. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.06 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

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PART 3 - EXECUTION

3.01 EXAMINATION

A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
   1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
   2. Provide inside latch and lock for break-glass panels.
   3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification:
   1. Apply vinyl lettering at locations indicated.

3.03 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 12 22 00 - CURTAINS AND DRAPES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Drapes.
   2. Drapery tracks.

1.02 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Drapery Tracks: Include maximum weights of drapes that can be supported.
   2. Fabrics.
   3. Textile treatments.

B. Shop Drawings:
   1. Drapery Tracks: Show installation and anchorage details and locations of controls.
   2. Drapes: Show sizes, locations, and details of installation.

C. Samples for Verification: As follows:
   1. Drapery Tracks: 18 inches long, with carriers, controls, and accessories.
   2. Drapery Fabrics: For each color and pattern indicated, full width by 36 inches long, from dye lot to be used for the Work and with specified textile treatments applied. Show complete pattern repeat if any. Mark top and face of fabric.
   3. Textile Trims: For each color and pattern indicated, 18 inches long.
   4. Drape Fabrication: For each heading, fabric, color, and pattern indicated, a complete full-size panel to verify details of fabrication and thread colors.

D. Product Schedule: For drapes and drapery tracks. Use same designations indicated on Drawings.

1.03 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For drapery track installation; reflected ceiling plans drawn to scale and coordinating track installation with openings and ceiling-mounted items, on which the following items are shown:
   1. Suspended ceiling components.

B. Product Certificates: For each drapery fabric treated with flame retardant, signed by fabric supplier and indicating treatment durability and cleaning procedures required to maintain treatment effectiveness.

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1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For products installed to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: For drapes and drapery tracks, fabricator of drapes.

1.06 FIELD CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before drape fabrication, and indicate measurements on Shop Drawings.

B. Scheduling: Do not deliver or install drapes until after other finish work, including painting, is complete and spaces are otherwise ready for occupancy.

PART 2 - PRODUCTS

2.01 DRAPERY TRACKS

A. Manually Operated Track:
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Forest Drapery Hardware.
   b. Kirsch.
   c. Silent Gliss Inc.; Silent Gliss International Ltd.
   d. Springs Window Fashions; SWFcontract.

2.02 DRAPES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Barjan Manufacturing Ltd.
2. Contract Shading Systems.
3. County Draperies, Inc.
4. Creative Draperies Inc.
5. DFB Sales, Inc.
6. Fabricut, Inc.
7. Fabtex.
8. Quiltcraft Industries, Inc.
9. Standard Textile Co., Inc.
10. Wesco Fabrics; RM COCO Decor Ltd.

B. Source Limitations: Obtain each color and pattern of drapery fabric and trim from one dye lot.

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C. Fire-Test-Response Characteristics: For fabrics treated with fire retardants, provide products that pass NFPA 701 as determined by testing of fabrics that were treated using treatment-application method intended for use for this Project by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.03 DRAPE FABRICATION

A. Fabricate drapes in heading styles and fullnesses indicated. Fabricate headings to stand erect. If less than a full width of fabric is required to produce panel of specified fullness, use equal widths of not less than one-half width of fabric located at ends of panel.
   1. One-Way-Stacking Drapes: Add 5 inches to overall width for returns.
   2. Center-Opening Drapes: Add 10 inches to overall width for overlap.

B. Seams: Sew vertical seams with twin-needle sewing machine with selvage trimmed and overlocked. Join widths so that patterns match and vertical seams lay flat and straight without puckering. Horizontal seams are unacceptable.

C. Side Hems: Double-turned, 1-1/2-inch- wide hems consisting of three layers of fabric, and blindstitched so that stitches are invisible on face of drape.

D. Bottom Hems: Double-turned, 4-inch- wide hems consisting of three layers of fabric, and weighted and blindstitched so that weights and stitches are invisible on face of drape.
   1. Sew in square lead weights at each seam and at panel corners.

E. Interlinings: Extend from top of drape to within 1/2 inch of lining's bottom hem and to leading edge of side hems to produce full-shadowed appearance.

F. Linings: Equal to widths of drapery fabric and joined to drapery fabric at top by inside invisible seam, and hand stitched at side hems and shadowed with 1-1/2-inch return of face fabric.

PART 3 - EXECUTION

3.01 DRAPERY TRACK INSTALLATION

A. Install track systems according to manufacturer's written instructions, level and plumb, and at height and location in relation to adjoining openings as indicated on Drawings.

B. Isolate metal parts of tracks and brackets from concrete, masonry, and mortar to prevent galvanic action. Use tape or another method recommended in writing by track manufacturer.

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3.02 DRAPE INSTALLATION

A. Where drapes abut overhead construction, hang drapes so that clearance between headings and overhead construction is 1/4 inch.

B. Where drapes extend to floor, install so that bottom hems clear finished floor by not more than 1 inch and not less than 1/2 inch.

C. Where drapes extend to windowsill, install so that bottom hems hang above sill line and clear sill line by not more than 1/2 inch.

3.03 ADJUSTING

A. After hanging drapes, test and adjust each drapery track to produce unencumbered, smooth operation.

B. Steam and dress down drapes as required to produce crease- and wrinkle-free installation.

C. Remove and replace drapes that are stained or soiled.

END OF SECTION

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SECTION 12 36 00 - COUNTERTOPS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Plastic-laminate-clad countertops.

B. Related Sections:
   1. Division 01 sustainable design requirements Section(s) for supplementary sustainable design criteria.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
   1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
   2. Show locations and sizes of cutouts and holes for items installed in countertops.
   3. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Verification: As follows:
   1. Countertops: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.

1.03 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:
   1. Documentation for adhesives, indicating VOC content.
   2. Documentation for composite wood products, indicating compliance with emissions testing or certification.

1.04 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.05 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with WI's North American Architectural Woodwork Standards (NAAWS) for grades indicated for construction, finishes, installation, and other requirements.
   1. Provide certificates and labels from WI certification program indicating that woodwork and installation complies with requirements of grades specified.

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2. Where the Contract Documents contain requirements that are more stringent than the referenced quality standard, comply with requirements of the Contract Documents in addition to those of the referenced quality standard.

B. Fabricator's Qualifications: 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.
1. Fabricator's Certification: Licensed participant in WI's Certified Compliance Program.

C. Installer Qualifications: Licensed participant in WI's Certified Compliance Program.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.

B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.07 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.01 SUSTAINABLE DESIGN CRITERIA

A. Sustainable Design Criteria: Comply with indicated criteria for the following product categories:
1. Adhesives:
a. VOC content limits for field applications.
2. Composite Wood Products:
a. Formaldehyde emissions testing or certification.

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2.02 PLASTIC-LAMINATE-CLAD COUNTERTOP MATERIALS

A. Grade: Custom.

B. High-Pressure Decorative Laminate: ISO 4586-3, Grade HGS .

C. 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 on Drawings.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces.

E. Core Material: MDF.

F. Core Material at Sinks: MDF made with exterior glue.

G. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

H. Paper Backing: Provide paper backing on underside of countertop substrate.

2.03 WOOD MATERIALS

A. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.
1. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.

2.04 ACCESSORIES

A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Basis-of-Design Product: Doug Mockett & Company, Inc.; .
2. Outside Diameter: 2-3/8 inches.
3. Color: As selected by Architect from manufacturer's full range,

2.05 MISCELLANEOUS MATERIALS

A. Countertop Support Brackets: As indicated on drawings.

2.06 PLASTIC-LAMINATE-CLAD COUNTERTOP FABRICATION

A. Fabricate countertops according to plastic laminate material manufacturer's written instructions and to the WI's "North American Architectural Woodwork Standards."
1. Grade: Custom.

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B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.

C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.02 PLASTIC-LAMINATE-CLAD COUNTERTOP INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
   1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. 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.

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 countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

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E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
   2. Secure backsplashes to walls with adhesive.
   3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.03 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces.

C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION

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SECTION 13 34 00 - FABRICATED ENGINEERED STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Fabricated engineered struc[illegible]uctural framing, secondary framing, and concrete footings of the f[illegible]
1. ~~Shade structures with fabric shades and r[illegible]~~

1.02 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct confe[illegible].
1. Review methods and procedures[illegible]ed engineered structures including, but not limited to, the fo[illegible]
a. Preparatory work perform[illegible]
b. Construction schedule.[illegible] of materials and erector's personnel, equipment.[illegible]ed to make progress and avoid delays.
c. Required tests, insp[illegible]tions.
d. Unfavorable weat[illegible] weather conditions and impact on construction sche[illegible]
e. Flashings, spec[illegible], penetrations, curbs, and condition of other construc[illegible]he work.

1.03 ACTION SUBMITTALS

A. Product Data: For e[illegible]ed engineered structure component.

B. Shop Drawings:
1. Include p[illegible]tions, structural connection details, and attachment details.
2. Detail[illegible]y, and attachment of shade fabric and metal roofing pane[illegible]

C. Sample[illegible]: For factory-applied finishes.

1.04 INFO[illegible]MITTALS

A. D[illegible]:
[illegible]s data indicating compliance with performance requirements and [illegible]signed and sealed by the qualified professional engineer responsible [illegible]paration.

F[illegible]ata: For manufacturer.

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C. Welding certificates.

D. Sample Warranties: For special warranties.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For shade f , operation and maintenance manuals.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified ma
1. Engineering Responsibility: Prepara ive engineering analysis and Shop Drawings by a professio egally qualified to practice in jurisdiction where Project is loc

B. Flashing and Sheet Metal Standa MACNA's "Architectural Sheet Metal Manual" unless more str s are specified or shown on Drawings.

C. Welding Qualifications: Qualif rsonnel according to the following:
1. AWS D1.1/D1.1M, "Str e - Str."
2. AWS D1.3, "Structura eet Steel."

D. Ready-Mix-Concrete M ifications: A firm experienced in manufacturing ready products and that complies with ASTM C 94/C 94M re uction facilities and equipment.

1.07 DELIVERY, STOR NG

A. Deliver compo oe damaged or deformed. Package for protection during transpo g.

1.08 WARRANT

A. Special urer and fabricator agree to repair or replace components of fab structures that fail in materials or workmanship within spec .
1. ut are not limited to, the following:
ailures including framework.
ion of fabric including seam failure.
ation of metals, metal finishes, and other materials beyond normal ering.
Engineered Structure Warranty Period: Ten years from date of ial Completion.

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3. Shade Fabric Warranty Period: Ten years from date of S tantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's m in which manufacturer agrees to repair finish or replace metal vidence of deterioration of factory-applied finishes within specified
1. Finish Warranty Period: 20 years from date of S n.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Fabricated Engineered to compliance with requirements, provide aseemblies by the able assemblies by an approved manufacturer:
1. ~~Fabric Shade Structures; USA Sh~~
2. ~~Metal Roof Panel Shade Structu~~ stems, Inc.

B. Source Limitations: Obtain syster uding primary and secondary framing and metal support assemb urce from single manufacturer.

2.02 SYSTEM DESCRIPTION

A. Provide a complete, integrat ependent components and assemblies that form a structure cap g structural and other loads, thermally induced movement, and without failure.

B. Structural Framing: M rd, consisting of primary frame, capable of supporting design loa

C. Secondary-Frame 's standard purlins, joists, and girts.

2.03 PERFORMANC S

A. Engage a d l engineer, as defined in Division 01 Section "Quality Requireme cated engineered structures.

B. Structu ricated engineered structures shall withstand the effects of gravit owing loads and stresses within limits and under conditions indic
1. indicated on Drawings and in accordance with DSA Pre-Check
its: No greater than the following:
and Rafters: Vertical deflection as required by roofing panel acturer.

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b. Design secondary-framing system to accommo[illegible] deflection of primary framing and construction tolerances, and t[illegible] clearances at openings.

C. Seismic Performance: Fabricated engineered structure[illegible]e effects of earthquake motions determined according to ASCE/S[illegible]

D. Thermal Movements: Allow for thermal move[illegible]nt and surface temperature changes by preventing buckling, [illegible] overstressing of components, failure of joint sealants, failure [illegible]d other detrimental effects. Base calculations on surface tempera[illegible]ue to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F, am[illegible]terial surfaces.

E. Wind-Uplift Resistance: Provide metal [illegible]emblies that comply with UL 580 for wind-uplift-resistance class [illegible]
1. Uplift Rating: UL 90.

F. Fire-Test-Response Characteristic[illegible]abrics with the fire-test-response characteristics indicated, as dete[illegible]uentical products according to test method indicated below by UL [illegible]nd inspecting agency acceptable to authorities having jurisdiction:
1. Flame-Resistance Rati[illegible]/01.
2. Surface-Burning Cha[illegible] with ASTM E84, extended; testing by a qualified testing age[illegible]ad Index of 25 or less.
3. Permanently attac[illegible]c indicating whether fabric is inherently and permanently flar[illegible]reated with flame-retardant chemicals, and whether it requ[illegible]r designated time period or cleaning.

2.04 STRUCTURAL S[illegible]

A. Cold-Formed S[illegible]ASI's "North American Specification for the Design of Cold-Formed [illegible]Members" for design requirements and allowable stresses.

B. Primary [illegible]acturer's standard primary-framing system, designed to withstar[illegible]d specified requirements.
1. F[illegible]'s standard zinc-rich primed and top-coated decorative finish [illegible]sh manufacturer's written instructions.

C. S[illegible] Manufacturer's standard secondary framing, including purlins, [illegible]nge bracing, base members, gable angles, clips, headers, jambs, [illegible]aneous structural members. Unless otherwise indicated, fabricate [illegible]allic-coated steel sheet.

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D. Miscellaneous Structural Members: Manufacturer's standa[illegible]s fabricated from zinc-coated (galvanized) steel; designed to withstand requ[illegible]

E. Anchors, Fasteners, Fittings, Hardware, and Installatio[illegible]nplying with performance requirements indicated and suitable for [illegible]s, supporting structure, anchoring substrates, and installation met[illegible]osion-resistant or noncorrodible units; weather-resistant, tamperr[illegible]neft-resistant, of one of the following materials:
1. Zinc coated steel.
2. Stainless steel.

F. Finish: Factory primed. Apply specified [illegible]ly after cleaning and pretreating.
1. Clean and prepare in accordance v[illegible]
2. Coat with manufacturer's standa[illegible] Apply primer to primary and secondary framing to a minimur[illegible]of 1 mil.
   a. Prime secondary framin[illegible]ated steel sheet to a minimum dry film thickness of 0.5[illegible]

2.05 SHEET METAL FLASHING

A. Metallic-Coated Steel Shee[illegible]s steel sheet, metallic coated by the hot-dip process and pr[illegible]coil-coating process to comply with ASTM A 755/A 755M.
1. Zinc-Coated (Ga[illegible]eet: ASTM A 653/A 653M, G90 coating designation; stru[illegible]
2. Aluminum-Zinc [illegible]el Sheet: ASTM A 792/A 792M, Class AZ50 coating desig[illegible]uctural quality.
3. Exposed Fir[illegible]
   a. Color[illegible]nufacturer's designations.

2.06 METAL ROO[illegible]

A. Provide fa[illegible] roof panels designed to be installed by lapping side edges o[illegible] and mechanically attaching panels to supports using expose[illegible]e laps. Include accessories required for weathertight install[illegible]
1. [illegible]eel Sheet: Zinc-coated (galvanized) steel sheet complying with [illegible]3M, G90 coating designation, or aluminum-zinc alloy-coated [illegible]plying with ASTM A792/A792M, Class AZ50 coating designation; [illegible]ity. Prepainted by the coil-coating process to comply with ASTM [illegible].
   [illegible]al Thickness: Manufacturers Standard.
   [illegible]h: Two-coat fluoropolymer, both sides of panels.
   [illegible]or: As selected by Architect from Manufacturer full range.

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2.07 SHADE FABRIC

A. Fabric:
1. Fiber Content: Manufacturer's standard .
2. Pattern and Color: As selected by Architect from ange.

B. Seam Thread: UV-light, mildew, and rot resistant.

2.08 CONCRETE MATERIALS

A. Furnish formwork and formwork accessories 1 (ACI 301M).

B. Forms for Cylindrical Columns, Pedestals cal, glass-fiber-reinforced plastic, paper, or fiber tubes that produc piral or vertical seams not exceeding specified formwork surface r
1. Provide forms with sufficient wa plastic concrete loads without detrimental deformation.

C. Concrete Reinforcement:
1. Reinforcing Bars: ASTM e 60 (Grade 420), deformed.
2. Plain-Steel Wire: ASTM wn.
3. Plain-Steel Welded Wi ASTM A 185/A 185M, fabricated from as-drawn steel wire in
4. Deformed-Steel We ment: ASTM A 497/A 497M, flat sheet.

D. Portland Cement: AS nless indicated otherwise.

E. Normal-Weight Ag 33, graded, 1-1/2-inch nominal maximum aggregate size.

F. Water: ASTM

2.09 CONCRETE

A. Normal-W repare design mixes, proportioned according to ACI 301 (ACI 30
1. M ve Strength: 4500 psi at 28 days.

B. Re : Measure, batch, mix, and deliver concrete according to A d ASTM C 1116/C 1116, and furnish batch ticket information.

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2.10 ACCESSORIES

A. General: Provide accessories as standard fabricated ...e system manufacturer and as specified. Fabricate and finish ... factory to greatest extent possible, by manufacturer's stand... processes. Comply with indicated profiles and with dimensional ...ements.

B. Steel Cable and Cable Fittings:
1. Cable: 7-by-19 wire cable made from ...with ASTM A1023, galvanized.
2. Cable Diameter: [1/8 inch] [5/32 inch] [3/8 inch].
3. Cable Fittings: Connectors of type ...ted from stainless or galvanized steel, and with capabili... failure, a load equal to minimum breaking strength of cabl... used.

2.11 FABRICATION

A. General: Design components and ...quired for erection to permit easy assembly.
1. Mark each piece and part ...orrespond with previously prepared erection drawings, diagr... manuals.
2. Fabricate structural fr...ean, smooth cuts and bends. Punch holes of proper size, ... Members shall be free of cracks, tears, and ruptures.

B. Primary Framing: Sho... components to indicated size and section, with baseplates, bea..., and other items required for erection welded into place. Cut, form...eld framing for bolted field assembly.
1. Shop Primin... for shop priming according to SSPC-SP 2. Shop prime prim...cified primer after fabrication.

C. Secondary Fr...te framing components to indicated size and section by roll formi..., with baseplates, bearing plates, stiffeners, and other plates rec... welded into place. Cut, form, punch, drill, and weld secondar... field connections to primary framing.
1. Sh...are uncoated surfaces for shop priming according to ...rime uncoated secondary framing with specified primer after

2.12 S...ICATION

A. ...abricate flashing and sheet metal to comply with recommendations ...rchitectural Sheet Metal Manual" that apply to design, dimensions, ...d thickness, and other characteristics of item indicated. Fabricate items ... greatest extent possible.

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1. Obtain field measurements for accurate fit before shop f[illegible]cation.
2. Form flashing and sheet metal without excessive oil [illegible]uckling, and tool marks and true to line and levels indicated, with ex[illegible]ded back to form hems.
3. Conceal fasteners and expansion provisions whe[illegible]ed fasteners are not allowed on faces exposed to view.

B. Sealed Joints: Form nonexpansion but movabl[illegible] accommodate elastomeric sealant.

C. Expansion Provisions: Where lapped expar[illegible]nnot be used, form expansion joints of intermeshing hooked flar[illegible] inch deep, filled with butyl sealant concealed within joints.

D. Fabricate cleats and attachment devi[illegible]terial as accessory being anchored or from compatible, noncorro[illegible]

E. Hanging Gutters: Fabricate to cross[illegible]omplete with end pieces, outlet tubes, and other accessories as re[illegible] minimum 96-inch- long sections. Furnish flat-stock gutter spacers[illegible]s fabricated from same metal as gutters, of size recommended b[illegible]ess than twice the gutter thickness. Fabricate expansion joints, e[illegible]s, and gutter accessories from same metal as gutters.
1. Gutters: (380 mm)F[illegible] the following materials:
   a. Galvanized St[illegible]
   b. Aluminum-Zi[illegible]el: 0.022 inch thick.

F. Downspouts: Fabrica[illegible]s complete with mitered elbows. Furnish with metal supports, fror[illegible] downspouts, and anchors.
1. Fabricate fr[illegible]ng materials: Schedule 40 pipe, galvanized and painted.

2.13 FABRIC FAB[illegible]

A. Fabricatio[illegible]oints and hardware attachment points with webbing. Seam fa[illegible]cated on the Drawings and as follows:
1. F[illegible]ms:
   [illegible] selvedge and cut fabric edges.
   [illegible]ealed.
   [illegible]ency welded.
   [illegible] bonded.
   [illegible]urer's standard hemming and seaming methods.
   [illegible]ment:
   [illegible]acturer's standard attachment system.

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3. Fabric connection points and cable exit points to be [illegible] reinforced and heat sealed with vinyl interfacing inserted and sewn betwe[illegible]of reinforcement. Fabric shall be pre-stressed prior to fabrication.

2.14 SOURCE QUALITY CONTROL

A. Special Inspection: Owner will engage a qualified s[illegible]perform source quality control inspections and to submit reports.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditio[illegible]sent, for compliance with requirements for installation tolerances [illegible].s affecting performance of the Work.

B. Before erection proceeds, surve[illegible] locations of concrete- and masonry-bearing surfaces and lo[illegible]rods, bearing plates, and other embedments to receive structur[illegible]ctor present, for compliance with requirements and manufacture[illegible]

C. Proceed with erection only a[illegible]onditions have been corrected.

3.02 PREPARATION

A. Provide temporary sh[illegible] and other supports during erection to keep structural framing s[illegible]n alignment against temporary construction loads and loads ec[illegible]esign loads. Remove temporary supports when permanent structu[illegible]tions, and bracing are in place unless otherwise indicated.

3.03 CONCRETE

A. Design, c[illegible]ace, and maintain formwork according to ACI 301 (ACI 301[illegible]

B. Place [illegible]ge devices and other embedded items required for adjoining work[illegible]pported by cast-in-place concrete. Use setting drawings, tem[illegible]structions, and directions furnished with items to be embedded.

C. [illegible]s "Manual of Standard Practice" for fabricating, placing, and [illegible]ement.

D[illegible]I 301 (ACI 301M) for placing concrete.

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E. Consolidate concrete with mechanical vibrating equipment.

F. Finish: Provide smooth, as-cast concrete finish impa[illegible] material, arranged in an orderly and symmetrical manner with a r[illegible] Repair and patch holes and defective areas. Remove fins and [illegible]xceeding 1/8 inch.

3.04 ERECTION OF STRUCTURAL FRAMING

A. Erect fabricated engineered structures accord[illegible]s written instructions and drawings.

B. Do not field cut, drill, or alter structural m[illegible]en approval from system manufacturer's professional engineer.

C. Set structural framing accurately in lo[illegible]ations indicated, according to AISC specifications referenced in [illegible]in structural stability of frame during erection.

D. Base and Bearing Plates: [illegible]nd masonry-bearing surfaces of bond-reducing materials, and [illegible]prior to setting plates. Clean bottom surface of plates.
1. Set plates for structur[illegible]ges, shims, or setting nuts as required.
2. Promptly pack grou[illegible]earing surfaces and plates so no voids remain. Neatly fini[illegible]s; protect grout and allow to cure. Comply with manufacture[illegible]n instructions for shrinkage-resistant grouts.

E. Align and adjust s[illegible]fore permanently fastening. Before assembly, clean bearing su[illegible]rfaces that will be in permanent contact with framing. Perform[illegible]ents to compensate for discrepancies in elevations and alignment.
1. Level ar[illegible]nembers of structure.

F. Secondary [illegible]ning level, plumb, rigid, secure, and true to line.

G. Bracing [illegible]re indicated on erection drawings.

H. Erec[illegible] Maintain erection tolerances of structural framing within AIS[illegible]

3.05 [illegible]EL INSTALLATION

A. [illegible] Panels: Fasten metal panels to supports with fasteners at each [illegible]cation and spacing recommended by manufacturer.

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1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical alignment. Use proper tools to obtain controlled uniform pressure for positive seal without rupture of washer.
4. Install screw fasteners with power tools having torque adjusted to compress washer tightly without damage to washers, threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closure at all openings.

3.06 SHEET METAL FLASHING INSTALLATION

A. General: Anchor flashing and sheet metal components of the Work securely in place, with provisions for thermal movement so that completed flashing and sheet metal shall not rattle, and shall remain watertight. Use fasteners, solder, welding rods, clips, separators, sealants, and other miscellaneous items as required for flashing and sheet metal system.
1. Install flashing and sheet metal at levels indicated. Provide uniform, neat seams with minimum exposed solder, welds, and sealant.
2. Install flashing and sheet metal to substrates and to result in watertight performance. Verify substrate conditions of surfaces to be covered before fabricating sheet metal.
3. Install exposed flashing and sheet metal without excessive oil canning, buckling, and tool marks.
4. Torch cutting of flashing and sheet metal is not permitted.

B. Hanging Gutters: Join gutter sections with riveted and soldered joints or with lapped joints sealed with sealant to allow for thermal expansion. Attach gutters at eave or fascia to firmly anchored brackets spaced not more than 36 inches apart. Provide end closures and seal watertight. Slope gutters to downspouts.
1. Install gutter expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections by welding. Provide hangers with fasteners designed to hold downspouts 1 inch clear to walls.

3.07 ACCESSORIES INSTALLATION

A. General: Install accessories with positive anchorage to building and provide for thermal movement. Coordinate installation with other components.
1. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant paint or by applying rubberized-asphalt underlayment to each contact surface, or permanent separation as recommended by manufacturer.

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3.08 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified spe rform field quality control special inspections and to submit reports

B. Concrete Tests: Perform according to ACI 301 (AC'

C. Installation will be considered defective if it does r spections.

D. Prepare test and inspection reports.

3.09 CLEANING AND PROTECTION

A. Repair damaged galvanized coatir d items according to ASTM A780/A780M.

B. Touchup Painting: After erection, p re, and prime or reprime field connections, rust spots, and abrac e-painted structural framing and accessories.
   1. Clean and prepare surf 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Toc
   2. Apply a compatible p e as shop primer used on adjacent surfaces.

END OF SECTION

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SECTION 22 00 50 - BASIC PLUMBING MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Electric motors.
   2. Motor starters.
   3. Strainers.
   4. Valve boxes.
   5. Access Doors.
   6. Flexible joints.
   7. Insulation.

1.02 RELATED REQUIREMENTS

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

B. This Section is a part of each Division 22 Section.

1.03 ADDITIONAL REQUIREMENTS

A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.

B. Make all temporary connections required to maintain services during the course of this Contract without additional cost to the Owner. Notify the Owner seven days in advance before disturbing any service.

C. Plumbing work done under this contract shall not adversely affect the operation of the existing plumbing systems.

1.04 REFERENCES AND STANDARDS

A. Where material or equipment is specified to conform to referenced standards, it shall be assumed that the most recent edition of the standard in effect at the time of bid shall be used.
   1. CSA – Canadian Standards Association International.
   2. ANSI - American National Standards Institute.
   3. ASTM - American Society for Testing and Materials.
   4. CCR - California Code of Regulations.

a. Title 8 - Division of Industrial Safety, Subchapter 7; General Industry Safety Orders, Articles 31 through 36.
5. NCPWB - National Certified Pipe Welding Bureau.
6. CEC - California Electrical Code.
7. NEMA - National Electrical Manufacturers' Association.
8. NFPA - National Fire Protection Association.
9. OSHA - Occupational Safety and Health Act.
10. UL - Underwriters' Laboratories, Inc.

B. Requirements of Regulatory Agencies:
1. The publications listed below form part of this specification; comply with provisions of these publications except as otherwise shown or specified.
a. California Building Code, 2022.
b. California Electrical Code, 2022.
c. California Energy Code, 2022.
d. California Fire Code, 2022.
e. California Green Building Standards Code, 2022.
f. California Mechanical Code, 2022.
g. California Plumbing Code, 2022.
h. California Code of Regulations, Title 24.
i. California Health and Safety Code.
j. CAL-OSHA.
k. California State Fire Marshal, Title 19 CCR.
l. National Fire Protection Association.
m. Occupational Safety and Health Administration.
n. Other applicable state laws.
2. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes, or to requirements of authorities having jurisdiction. It is not the intent of Drawings or specifications to repeat requirements of codes except where necessary for clarity.

1.05 DRAWINGS

A. Examine Contract Documents prior to bidding of work and report discrepancies in writing to Architect.

B. Drawings showing location of equipment and materials are diagrammatic and job conditions will not always permit installation in location shown. The Plumbing Drawings show general arrangement of equipment and materials, etc., and shall be followed as closely as existing conditions, actual building construction, and work of other trades permit.
1. Architectural and Structural Drawings shall be considered part of the Work. These Drawings furnish Contractor with information relating to design and construction of the Project. Architectural Drawings take precedence over Plumbing Drawings.

2. Because of the small scale of Plumbing Drawings, not all offsets, fittings, and accessories required are shown. Investigate structural and finish conditions affecting the Work and arrange Work accordingly. Provide offsets, fittings, and accessories required to meet conditions. Inform Architect immediately when job conditions do not permit installation of equipment and materials in the locations shown. Obtain the Architects approval prior to relocation of equipment and materials.
3. Relocate equipment and materials installed without prior approval of the Architect. Remove and relocate equipment and materials at Contactors' expense upon Architects' direction.
4. Minor changes in locations of equipment, piping, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.

C. Execute work mentioned in Specifications and not shown on Drawings, or vice versa, the same as if specifically mentioned or shown in both.

1.06 FEES AND PERMITS

A. Obtain and pay for all permits and service required in installation of this work; arrange for required inspections and secure approvals from authorities having jurisdiction. Comply with requirements of Division 01.

B. Arrange for utility connections and pay charges incurred, including excess service charges.
1. Bear the cost of construction related to utility services, from point of connection to utility services shown on Contract Documents. This includes piping, excavation, backfill, meters, boxes, check valves, backflow prevention devices, general service valves, concrete work, and the like, whether or not Work is performed by Contractor, local water/sanitation district, public utility, other governmental agencies or agencies' assigns.

C. Prior to the start of construction, contact local gas company representative and coordinate location of gas meter and piping. In addition, coordinate time required for installation, in order to avoid delay to the Project.

D. Coordination:
1. General:
a. Coordinate plumbing Work with trades covered in other Specifications Sections to provide a complete, operable and sanitary installation of the highest quality workmanship.
2. Electrical Coordination:

a. Refer to the Electrical Drawings and Specifications, Division 26, for service voltage and power feed wiring for equipment specified under this section. Contractor has full responsibility for the following items of work:
   1) Review the Electrical Drawings and Division 26 Specifications to verify that electrical services provided are adequate and compatible with equipment requirements.
   2) If additional electrical services are required above that indicated on Electrical Drawings and in Division 26, such as more control interlock conductors, larger feeder, or separate 120 volt control power source, include cost to furnish and install additional electrical services as part of the bid.
   3) Prior to proceeding with installation of additional electrical work, submit detailed drawings indicating exact scope of additional electrical work.

3. Mechanical Coordination:
   a. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to accommodate mechanical system installation.
   b. Coordinate installation of supporting devices. Set sleeves in poured-in-place concrete and other structural components during progress of construction.
   c. Coordinate requirements for access panels and doors for mechanical items requiring access where concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section “Access Doors and Frames.”
   d. Coordinate with other trades equipment locations, pipe, duct and conduit runs, electrical outlets and fixtures, air inlets and outlets, and structural and architectural features. Provide information on location of piping and seismic bracing to other trades as required for a completely coordinated project.

1.07 SUBMITTALS - GENERAL

A. Refer to Division 01 Submittals Section(s) for additional requirements.

B. Submittal packages may be submitted via email as PDF electronic files, or as printed packages. PDFs shall be legible at actual size (100 percent). Provide seven copies of printed submittal packages.

C. Provide submittal of materials proposed for use as part of this Project. Product names in Specifications and on Drawings are used as standards of quality. Furnish standard items on specified equipment at no extra cost to the Contract regardless of disposition of submittal data. Other materials or methods shall not be used unless approved in writing by Architect. Architect's review will be required even though "or equal" or synonymous terms are used.
   1. Partial or incomplete submittals will not be considered.
   2. Quantities are Contractor's responsibility and will not be reviewed.

3. Provide materials of the same brand or manufacturer for each class of equipment or material.
4. Identify each item by manufacturer, brand, trade name, number, size, rating, or other data necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.
5. Identify each submittal item by reference to items' Specification Section number and paragraph, by Drawing and detail number, and by unit tag number.
6. Organize submittals in same sequence as in Specification Sections.
7. Show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, and weight.
    a. Submit Shop Drawings, performance curves, and other pertinent data, showing size and capacity of proposed materials.
    b. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of Contract Documents.
    c. Drawings shall be drawn to scale and dimensioned (except schematic diagrams). Drawings may be prepared by vendor but must be submitted as instruments of Contractor, thoroughly checked and signed by Contractor before submission to Architect for review.
    d. Catalog cuts and published material may be included with supplemental scaled drawings.

D. Review of submittals will be only for general conformance with design concept and general compliance with information given in Contract Documents. Review will not include quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with work of other trades, or construction safety precautions, which are sole responsibility of Contractor. Review of a component of an assembly does not indicate acceptance of an assembly. Deviations from Contract Documents not clearly identified by Contractor are Contractor's responsibility and will not be reviewed by Architect.

E. Within reasonable time after award of contract and in ample time to avoid delay of construction, submit to Architect Shop Drawings or submittals on all items of equipment and materials provided. Provide submittal in at least seven copies and in complete package.
    1. Shop Drawings and submittals shall include Specification Section, Paragraph number, and Drawing unit symbol or detail number for reference. Organize submittals into booklets for each Specification section and submit in loose-leaf binders with index. Deviations from the Contract Documents shall be prominently displayed in the front of the submittal package and referenced to the applicable Contract requirement.

F. Furnish to the Project Inspector complete installation instructions on material and equipment before starting installation.

1.08 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing systems materials and products.

B. Shop Drawings.

C. Sustainable Design Submittals:
1. Product Data: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.
2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.

D. Pipe, pipe or plumbing fittings, fixtures, solder and flux installed in a system providing water for human consumption shall comply with lead free requirements of the California Health and Safety Code Section 11 68 75. Provide submittal information for products third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

1.09 INFORMATIONAL SUBMITTALS

A. Provide layouts for plumbing systems, for inclusion in coordinated layout specified in Section 23 80 00. Comply with requirements for layouts specified in Section 23 80 00.

1.10 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
1. Refer to Division 01 for complete instructions.
2. Furnish three complete sets of Operation and Maintenance Manual bound in hardboard binder, and one compact disc containing complete Operation and Maintenance Manual in searchable PDF format. Provide Table of Contents. Provide index tabs for each piece of equipment in binder and disc. Begin compiling data upon approval of submittals.
a. Sets shall incorporate the following:
1) Product Data.
2) Shop Drawings.
3) Record Drawings.
4) Service telephone number, address and contact person for each category of equipment or system.
5) Complete operating and maintenance instructions for each item of plumbing equipment and systems.
6) Copies of guarantees/warrantees for each item of equipment and systems.
7) Test data and system balancing reports.

8) Typewritten maintenance instructions for each item of equipment listing lubricants to be used, frequency of lubrication, inspections required, adjustment, etc.
9) Manufacturers' bulletins with parts numbers, instructions, etc., for each item of equipment.
10) Control diagrams and literature.
11) A complete list or schedule of all scheduled valves giving the number of the valve, location and the rooms or area controlled by the valve. Identify each valve with a permanently attached metal tag stamped with number to match schedule. Post list in frame under plastic on wall in mechanical room or where directed by Architect.
12) Check test and start reports for each piece of plumbing equipment provided as part of the Work.
13) Commissioning and Preliminary Operation Tests required as part of the Work.

b. Post service telephone numbers and/or addresses in an appropriate place as designated by the Architect.

B. Record Drawings:
1. Refer to Division 01, Record Documents, for requirements governing Work specified herein.
2. Upon completion of the work, deliver to Architect the following:
a. Originals of drawings showing the Work exactly as installed.
b. One complete set of reproducible drawings showing the Work exactly as installed.
c. One compact disc with complete set of drawings in PDF format showing the Work exactly as installed.
d. Provide Contractor’s signature, verifying accuracy of record drawings.
e. Obtain the signature of the Project Inspector for all record drawings.

1.11 SUBSTITUTIONS

A. Refer to Division 01 for complete instructions. Requirements given below are in addition to or are intended to amplify Division 01 requirements. In the case of conflict between requirements given herein and those of Division 01, Division 01 requirements shall apply.

B. It is the responsibility of Contractor to assume costs incurred because of additional work and or changes required to incorporate proposed substitute into the Project. Refer to Division 01 for complete instructions.

C. Substitutions will be interpreted to be all manufacturers other than those specifically listed in the Contract Documents by brand name, model or catalog number.

D. Only one request for substitution will be considered for each item of equipment or material.

E. Substitution requests shall include the following:
   1. Reason for substitution request.
   2. Complete submittal information as described herein; see “Submittals.”
   3. Coordinated scale layout drawings depicting position of substituted equipment in relation to other work, with required clearances for operation, maintenance and replacement.
   4. List optional features required for substituted equipment to meet functional requirements of the system as indicated in Contract Documents.
   5. Explanation of impact on connected utilities.
   6. Explanation of impact on structural supports.

F. Installation of reviewed substitution is the Contractors’ responsibility. Any mechanical, electrical, structural, or other changes required for installation of reviewed substituted equipment or material must be made by the Contractor without additional cost to the Owner. Review by the Architect of the substituted equipment or material, including dimensioned Drawings will not waive these requirements.

G. Contractor may be required to compensate the Architect for costs related to substituted equipment or material.

1.12 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with plumbing systems work similar to that required for this Project.

C. California Health and Safety Code Compliance: For products covered under the scope of HSC 116875 for potable water service. Products for potable water service shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

D. Comply with applicable portions of California Plumbing Code pertaining to selection and installation of plumbing materials and products.

E. All materials and products shall be new and shall match existing.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Protect equipment and piping delivered to Project site from weather, humidity and temperature variations, dirt, dust and other contaminants.

1.14 FIELD CONDITIONS

A. Contractor shall visit Project site and examine existing conditions in order to become familiar with Project scope. Verify dimensions shown on Drawings at Project site. Bring discrepancies to the attention of Architect. Failure to examine Project site shall not constitute basis for claims for additional work because of lack of knowledge or location of hidden conditions that affect Project scope.

B. Information on Drawings relative to existing conditions is approximate. Deviations from Drawings necessary during progress of construction to conform to actual conditions shall be approved by the Architect and shall be made without additional cost to the Owner. The Contractor shall be held responsible for damage caused to existing services. Promptly notify the Architect if services are found which are not shown on Drawings.

1.15 WARRANTY

A. Refer to Division 01 for warranty requirements, and duration and effective date of Contractor’s Standard Guarantee.

B. Repair or replace defective work, material, or part that appears within the warranty period, including damage caused by leaks.

C. On failure to comply with the warranty requirements within a reasonable length of time after notification is given, the Architect/Owner shall have the repairs made at the Contractor's expense.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials or equipment of the same type shall be of the same brand wherever possible. All materials shall be new and in first class condition.

B. All sizes, capacities, and efficiency ratings shown are minimum, except that gas capacity is maximum available.

C. Refer to Sections 22 10 00 and 23 80 00 for specific system piping materials.

2.02 MATERIALS AND PRODUCTS

A. No material installed as part of this Work shall contain asbestos.

B. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.03 ELECTRIC MOTORS

A. General Motor Requirements: Comply with NEMA MG 1 unless otherwise indicated. Comply with IEEE 841 for severe-duty motors.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
      a. U.S. Motors.
      b. Century Electric.
      c. General Electric.
      d. Lincoln.
      e. Gould.

B. Motor Characteristics: Designed for continuous duty at ambient temperature of 40 deg. C and at altitude of 3300 feet above sea level. Capacity and torque shall be sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
   1. Motors exceeding the nameplate amperage shall be promptly replaced at no cost to the Owner. Horsepower shown is minimum and shall be increased as necessary to comply with above requirements. Furnish motors with splash-proof or weatherproof housings, where required or recommended by the manufacturer. Match the nameplate voltage rating with the electrical service supplied. Check Electrical Drawings. Provide a transformer for each motor not wound specifically for system voltage.

C. Polyphase Motors: NEMA MG 1, Design B, medium induction motor, premium efficiency as defined in NEMA MG 1. Select motors with service factor of 1.15. Provide motor with random-wound, squirrel cage rotor, and permanently lubricated or regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading. Temperature rise shall match insulation rating. Provide Class F insulation.
   1. Multispeed motors shall have separate windings for each speed.

D. Polyphase Motors with Additional Requirements:
   1. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
   2. Motors Used with Variable Frequency Controllers:

a. Separately Connected Motors: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
b. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
c. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
d. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
e. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
f. Each motor shall be provided with a shaft grounding device for stray current protection.

3. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

E. Single-Phase Motors:
1. Select motors with service factor of 1.15.
2. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
a. Permanent-split capacitor.
b. Split phase.
c. Capacitor start, inductor run.
d. Capacitor start, capacitor run.
3. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
4. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
5. Motors 1/20 HP and Smaller: Shaded-pole type.

F. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.04 MOTOR STARTERS

A. Square D, Allen Bradley, or equal, in NEMA Type 1 enclosure, unless otherwise specified or required. Minimum starter size shall be Size 1. Provide NEMA 3R enclosure where exposed to outdoors.

B. Provide magnetic motor starters for equipment provided under the Mechanical Work. Starters shall be non-combination type. Provide part winding or reduced voltage start motors where shown or as hereinafter specified. Minimum size starter shall be Size 1.
1. All starters shall have the following:
a. Cover mounted hand-off-automatic switch. Starters installed exposed in occupied spaces shall have key operated HOA switch.
b. Ambient compensated thermal overload.

c. Fused control transformer (for 120 or 24 volt service).
d. Pilot lights, integral with the starters. Starters located outdoors shall be in NEMA IIIR enclosures.

2. Where three phase motors are provided for two-speed operation, provide two speed motor starters.
3. Starters for single-phase motors shall have thermal overloads. NEMA I enclosure for starters located indoors, NEMA IIIR enclosure for starters located outdoors.
4. Provide OSHA label indicating the device starts automatically.

2.05 STRAINERS FOR POTABLE WATER SYSTEMS

A. Strainers: Full line size, conforming to lead-free requirements of California Health and safety Code Section 11 68 75. "Y" pattern, 125 psi SWP minimum, with 304 stainless steel screens. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
a. 3 inches and smaller: bronze or brass body, threaded ends, with 20 mesh screen. Watts LF777SI, Wilkins SXL.

2.06 STRAINERS FOR NON-POTABLE WATER SYSTEMS

A. Charles M. Bailey #100A, Armstrong, Muessco, or equal, Fig. 11 "Y" pattern, 125 psi WP minimum, with monel screens with 20 square mesh for 2 inches and smaller and 3/64 inch perforations for 2-1/2 inches and larger. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.

2.07 VALVE BOXES

A. General:
1. Where several valves or other equipment are grouped together, provide larger boxes of rectangular “vault” type adequately sized for condition and similar in construction to those specified above.
2. Provide valve box extensions as required to set bottom of valve box tight up to top of piping in which valve is installed.
3. Provide a tee handle wrench for each size, Alhambra Foundry Co. #A-3008, or equal.

2.08 ACCESS DOORS

A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.

1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.

B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.

C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.

D. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.

E. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.

F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:
1. Milcor
   a. Style K (plaster).
   b. Style DW (gypsum board).
   c. Style M (Masonry).
   d. Style "Fire Rated" where required.

2.09 FLEXIBLE JOINTS

A. Where indicated on Drawings, provide Metraflex Metrasphere, Style R, Mason Industries, or equal, Spherical Expansion Joints. Provide control units at each expansion joint, arranged to limit both expansion and compression.

B. Flexible joints at entry points to building shall be Barco Ductile iron, Advanced Thermal Systems, or equal, threaded style with stainless ball and mineral filled seal.

2.10 PIPE GUIDES

A. Where flexible connections are indicated on Drawings, provide Metraflex style IV, B-Line, or equal, pipe guides in locations recommended by manufacturer. Maximum spacing from flexible connection to first pipe guide is 4 pipe diameters, and maximum spacing from second pipe guide is 14 pipe diameters.

2.11 EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

2.12 PIPE IDENTIFICATION

A. Identify each piping system and indicate the direction of flow by means of Seton, Inc., Marking Services Inc., Reef Industries, Inc., or equal, pre-tensioned, coiled semi-rigid plastic pipe labels formed to circumference of pipe, requiring no fasteners or adhesive for attachment to pipe.

B. The legends and flow arrows shall conform to ASME A13.1.

2.13 INSULATION WORK

A. General:
1. For insulating domestic hot water pumps, refer to Section 22 50 00, Plumbing Equipment,
2. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).
3. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
4. The term "piping" used herein includes pipe, valves, strainers and fittings.
5. Apply insulating cement to fittings, valves and strainers and trowel smooth to the thickness of adjacent covering. Cover with jacket to match piping. Extend covering on valves up to the bonnet. Leave strainer cleanout plugs accessible.
6. Provide pre-formed PVC valve and fitting covers.
7. Provide Calcium Silicate rigid insulation and sheet metal sleeve, 18 inch minimum length at each pipe hanger. Seal ends of insulation to make vapor tight with jacket.
8. Test insulation, jackets and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723 or ASTM E84.
9. Clean thoroughly, test and have approved, all piping and equipment before installing insulation and/or covering.
10. Repair all damage to existing pipe and equipment insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.

B. Insulation of Piping:

1. Insulate domestic hot and tempered water with minimum 3-1/2 pounds per cubic foot density fiberglass with ASJ-SSL jacket. Insulation thickness shall be the following:
   a. Pipe 3/4 inches and smaller: 1 inch thick.
   b. Pipe 1 inch through 1-1/2 inches: 1-1/2 inches thick.
   c. Pipe 2 inches and larger: 2 inches thick.
2. Insulate domestic hot water piping under slab on grade with Owens Corning Foamglas, preformed pipe insulation, or equal. Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Cover pipe and fittings with insulation manufacturer's recommended jacketing. Insulation thickness shall be the following:
   a. Pipe 3/4 inches and smaller: 2 inches thick.
   b. Pipe 1 inch and larger: 3 inches thick.
3. Insulate domestic cold water piping located within building, outside of insulation envelope in outside walls, vented attic spaces, and unheated spaces, including equipment rooms and below raised floor with 1 inch thick molded fiberglass, minimum 3-1/2 pound per cubic foot density, with ASJ-SSL jacket.
4. Insulate domestic cold water piping located outside building exposed to weather with minimum 3-1/2 pounds per cubic foot density fiberglass with ASJ-SSL jacket. Insulation thickness for all pipe sizes: 2 inches.
5. Insulate roof drain and overflow drain bodies, horizontal sections of rainwater leader piping and overflow piping, and condensate drains within the building envelope with 1 inch thick fiberglass, minimum 3-1/2 pound per cubic foot density, with ASJ-SSL jacket.
6.
7. Exposed insulated piping within the building shall have a Zeston 2000 25/50, Proto Lo-Smoke, or equal, PVC jacket and fitting cover installed over the insulation, applied per manufacturer's instructions. Insulation shall be vapor tight before applying PVC jacket and fitting covers. Verify suitability with manufacturer of insulation. Insulation with pre-applied polymer jacket may be substituted at Contractor's option.
8. Where insulated piping is exposed to the weather apply aluminum jacket secured with 1/2 inch stainless-steel bands on 12 inch centers. Insulation shall be vapor tight before applying metal jacket, and aluminum fitting covers. Install jacketing with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Cover fittings with glass cloth, two coats of Foster Sealfas 30-36, and factory-fabricated aluminum fitting covers, of same material, finish, and thickness as jacket. Insulation shall be vapor tight before applying metal jacket and fitting covers.
   a. Fitting covers:
      1) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      2) Tee covers.
      3) Flange and union covers.

4) End caps.
5) Beveled collars.
6) Valve covers.
7) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

b. Jacket thickness:
1) Pipes 10 inches diameter and smaller: Minimum .016 inch thick jacket with smooth finish.
2) Pipes 12 inches diameter and larger: Minimum .020 inch thick jacket with smooth finish.

PART 3 - EXECUTION

3.01 EXISTING MATERIALS

A. Remove existing equipment, piping, wiring, construction, etc., which interferes with Work of this Contract. Promptly return to service upon completion of work in the area. Replace items damaged by Contractor with new material to match existing.

B. Removed materials which will not be re-installed and which are not claimed by Owner shall become property of Contractor and shall be removed from Project site. Consult Owner before removing any material from Project site. Carefully remove materials claimed by Owner to prevent damage and deliver to Owner-designated storage location.

C. Existing piping and wiring not reused and are concealed in building construction may be abandoned in place and all ends shall be capped or plugged. Remove unused piping and wiring exposed in Equipment Rooms or occupied spaces. Material shall be removed from Project premises. Disconnect power, water, gas, pump or any other active energy source from piping or electrical service prior to abandoning in place.

D. Existing piping, ductwork, and equipment modified or altered as part of this Work shall comply with the most recent applicable code requirements.

3.02 FRAMING, CUTTING AND PATCHING

A. Special framing, recesses, chases and backing for Work of this Section, unless otherwise specified, are covered under other Specification Sections.

B. Contractor is responsible for placement of pipe sleeves, hangers, inserts, supports, and location of openings for the Work.

C. Cutting, patching, and repairing of existing construction to permit installation of equipment, and materials is the responsibility of Contractor. Repair or replace damage to existing work with skilled mechanics for each trade.

D. Cut existing concrete construction with a concrete saw. Do not utilize pneumatic devices.

E. Core openings through existing construction for passage of new piping and conduits. Cut holes of minimum diameter to suit size of pipe and associated insulation installed. Coordinate with building structure, and obtain Structural Engineer's approval prior to coring through existing construction.

3.03 PLUMBING DEMOLITION

A. Refer to Division 01 Sections “Cutting and Patching” and “Selective Demolition” for general demolition requirements and procedures.

B. Disconnect, dismantle and remove mechanical systems, equipment, and components indicated to be removed. Coordinate with all other trades.
1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping to remain with same or compatible piping material. Refrigerant system must be evacuated per EPA requirements.
3. Equipment to Be Removed: Drain down and cap remaining services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.04 ELECTRICAL REQUIREMENTS

A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.

B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIR with factory-wired strip heaters in each starter enclosure and temperature control panel where required to inhibit condensation.

C. All line voltage and low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.05 PIPING SYSTEM REQUIREMENTS

A. Drawing plans, schematic and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

3.06 PRIMING AND PAINTING

A. Perform priming and painting on the equipment and materials as specified herein.

B. See Division 09 Painting Section(s) for detailed requirements.

C. Priming and Painting:
1. Exposed ferrous metals, including piping, which are not galvanized or factory-finished shall be primed and painted.
a. Black Steel Piping:
1) Primer: One coat gray Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, comparable products by Rust-Oleum, Kelly Moore, or equal.
2) Topcoat: Two coats gray Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane Enamel, comparable products by Rust-Oleum, Kelly Moore, or equal.
2. Metal surfaces of items to be jacketed or insulated except piping shall be given two coats of primer unless furnished with equivalent factory finish. Items to be primed shall be properly cleaned by effective means free of rust, dirt, scale, grease and other deleterious matter and then primed with the best available grade of zinc rich primer. After erection or installation, all primed surfaces shall be properly cleaned of any foreign or deleterious matter that might impair proper bonding of subsequent paint coatings. Any abrasion or other damage to the shop or field prime coat shall be properly repaired and touched up with the same material used for the original priming.
3. Where equipment is provided with nameplate data, the nameplate shall be masked off prior to painting. When painting is completed, remove masking material.

3.07 PIPING SYSTEMS INSTALLATION

A. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect

immediately. Do not allow piping systems to be pressurized without written consent of the Architect.

B. General:
1. All piping shall be concealed unless shown or otherwise directed. Allow sufficient space for ceiling panel removal.
2. Installation of piping shall be made with appropriate fittings. Bending of piping will not be accepted.
3. Install piping to permit application of insulation and to allow valve servicing.
4. Where piping or conduit is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
5. Horizontal runs of pipes and/or electrical conduit suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.
6. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.
7. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.
8. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.
9. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.
10. Install horizontal valves with valve stem above horizontal.
11. Use reducing fittings; bushings shall not be allowed. Use eccentric reducing fittings wherever necessary to provide free drainage of lines and passage of air.
12. Verify final equipment locations for roughing-in.
13. Service Markers: Mark the location of each plugged or capped pipe with a 4 inch round by 30 inch long concrete marker, set flush with finish grade. Provide 2-1/2 inch diameter engraved brass plate as part of monument marker.
14. Furnish and install anchors or thrust blocks on PVC water lines in the ground, at all changes in direction of piping, and at all connections or branches from mains 1-1/2 inch and larger. Form anchors or thrust blocks by pouring concrete between pipe and trench wall. Thrust blocks shall be of adequate size and so placed as to take thrusts created by maximum internal water pressure. Sizing and placement shall be per manufacturer's recommendations, CPC, and IAPMO installation standards. Anchor piping to building construction.
15. Sanitary Sewer and Storm Drain: Grade piping inside building uniformly 1/4 inch per foot if possible but not less than 1/8 inch per foot. Run piping as straight as possible. Make piping connections between building piping and outside service pipe with cast iron reducers or increasers. Slope sewers uniformly between given elevations where invert elevations are shown.

16. Where piping is installed in walls within one inch of the face of stud, provide a 16 gauge sheet metal shield plate on the face of the stud. The shield plate shall extend a minimum of 1-1/2 inches beyond the outside diameter of the pipe.

C. Sleeves:
1. Install Adjus-to-Crete, Pipeline Seal and Insulator, or equal, pipe sleeves of sufficient size to allow for free motion of pipe, 24 gauge galvanized steel. The space between pipe and sleeves through floor slabs on ground, through outside walls above or below grade, through roof, and other locations as directed shall be caulked with oakum and mastic and made watertight. The space between pipe and sleeve and between sleeve and slab or wall shall be sealed watertight.
2. At Contractor's option, Link-Seal, Metraflex Metraseal, or equal, casing seals may be used in lieu of caulking. Wrap pipes through slabs on grade with 1 inch thick fiberglass insulation to completely isolate the pipe from the concrete.

D. Floor, Wall, and Ceiling Plates:
1. Fit all pipes with or without insulation passing through walls, floors, or ceilings, and all hanger rods penetrating finished ceilings with chrome-plated or stainless escutcheon plates.

E. Firestopping:
1. Pack the annular space between the pipe sleeves and the pipe through all floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.
   a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.
2. Provide SpecSeal Systems UL fire rated sleeve/coupling penetrators for each pipe penetration or fixture opening passing through floors, walls, partitions or floor/ceiling assemblies. All Penetrators shall comply with UL Fire Resistance Directory (Latest Edition), and in accordance with Chapter 7, CBC requirements.
3. Sleeve penetrators shall have a built in anchor ring for waterproofing and anchoring into concrete pours or use the special fit cored hole penetrator for cored holes.
4. Copper and steel piping shall have SpecSeal plugs on both sides of the penetrator to reduce noise and to provide waterproofing.
5. All above Systems to be installed in strict accordance with manufacturer's instructions.
6. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

F. Flashing:

1. Flashing for penetrations of metal or membrane roof for mechanical items such as flues and pipes shall be coordinated with the roofing manufacturer and roofing installer for the specific roofing type. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.
    a. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.
    b. Furnish and install counterflashing above each flashing required. Provide vandalproof top and flashing combination. Provide vandalproof top for each plumbing vent through roof. JR Smith Model 1748, or equal.

G. Hangers and Supports:
1. General: Support equipment and piping so that it is firmly held in place by approved iron hangers and supports and special hangers. Hanger and support components shall support weight of equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. Rigidly fasten hose faucets, fixture stops, compressed air outlets, and similar items to the building construction. The Architect shall approve hanger material before installation. Do not support piping with plumbers' tape, wire rope, wood, or other makeshift devices. Where building structural members do not match piping support spacing, provide “bridging” support members firmly attached to building structural members in a fashion approved by the structural engineer.
    a. Materials, design, and type numbers per Manufacturers' Standardization Society (MSS), Standard Practice (SP)-58.
        1) Provide copper-plated or felt-lined hangers for use on copper tubing.
2. Hanger components shall be provided by one manufacturer: B-Line, Grinnell, Unistrut, Badger, or equal.
3. Riser clamps: B-line model B3373, or equal.
4. Pipe Hanger and Support Placement and Spacing:
    a. Vertical piping support spacing: Provide riser clamps for piping, above each floor, in contact with the floor. Provide support at joints, branches, and horizontal offsets. Provide additional support for vertical piping, spaced at or within the following maximum limits:

Pipe Diameter	Steel Threaded or Welded (Note 3)	Steel Gas	Copper Brazed or Soldered (Note 3)	CPVC & PVC (Note 2)
1/2 - 1”	12 ft.	6 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)
1-1/4 - 2”	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft..	Base and Each Floor (Note 1)
2-1/2 - 3”	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)
Over 4”	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)

1) Note 1: Provide mid-story guides.
2) Note 2: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.
3) Note 3: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.

b. Vertical cast iron piping support spacing: Base and each floor not to exceed 15 feet.

c. Horizontal piping, hanger and support spacing: Locate hangers and supports at each change of direction, within one foot of elbow, and spaced at or within following maximum limits:

Pipe Diameter	Steel Threaded or Welded (Note 2)	Steel Gas	Copper Brazed or Soldered (Notes 2, 3)	CPVC & PVC (Note 1)
1/2 - 1"	6 ft.	6 ft.	5 ft.	3 ft.
1-1/4 - 2"	7 ft.	10 ft.	6 ft.	4 ft.
2-1/2 - 3"	10 ft.	10 ft.	10 ft.	4 ft.
Over 4"	10 ft.	10 ft.	10 ft.	4 ft.

1) Note 1: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.
2) Note 2: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.
3) Note 3: Includes all refrigerant piping, including vapor and hot gas pipes.

d. Horizontal cast iron piping support spacing:
1) Support piping at every other joint for piping length of less than 4 feet.
2) For piping longer than 4 feet, provide support on each side of the coupling, within 18 inches of each joint.
3) Hanger shall not be installed on the coupling.
4) Provide support at each horizontal branch connection.
5) Provide sway brace at 40 foot maximum spacing for suspended pipe with no-hub joints, except where a lesser spacing is required by the seismic design criteria used in delegated design for seismic systems. Refer to Article, Submittals.
6) Provide a brace on each side of a change in direction of 90 degrees or more.

5. Suspended Piping:
a. Individually suspended piping: B-Line B3690 J-Hanger or B3100 Clevis, complete with threaded rod, or equal. All hangers on supply and return piping handling heating hot water or steam shall have a swing connector at point of support.

Pipe Size	Rod Size Diameter
2" and Smaller	3/8"
2-1/2" to 3-1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

b. Trapeze Suspension: B-Line 1-5/8 inch width channel in accordance with manufacturer's published load ratings. No deflection to exceed 1/180 of a span.
c. Trapeze Supporting Rods: Shall have a safety factor of five; securely anchor to building structure.
d. Pipe Clamps and Straps: B-Line B2000, B2400; isolate copper pipe with two thicknesses of 2 inches wide 10-mil polyvinyl tape. Where used for seismic support systems, provide B-Line B2400 series pipe straps.
e. Concrete Inserts: B-line B22-I continuous insert or B2500 spot insert. Do not use actuated fasteners for support of overhead piping unless approved by Architect.
f. Steel Connectors: Beam clamps with retainers.

6. Support to Structure:
   a. Wood Structure: Provide and install wood blocking as required to suit structure. Provide lag screws or through bolts with length to suit requirements, and with size (diameter) to match the size of hanger rods required.
      1) Do not install Lag screws in tension without written review and acceptance by Structural Engineer.

Side Beam Angle Clip	B-Line B3062---MSS Type 34
Side Beam Angle Clip	B-Line B3060
Ceiling Flange	B-Line B3199

      2) Blocking for support of piping shall be not less than 2 inch thick for piping up to 2 inch size. Provide 3 inch blocking for piping up through 5 inch size, and 4 inch blocking for larger piping. Provide support for blocking in accordance with Structural Engineers requirements.
      3) Where lag screws are used, length of screw shall be 1/2 inch less than the wood blocking. Pre-drill starter holes for each lag screw.
   b. Steel Structure: Provide and install additional steel bracing as required to suit structure. Provide through bolts with length to suit requirements of the

structural components. Burning or welding on any structural member may only be done if approved by the Architect.

7. Rubber Neoprene Pipe Isolators:
   a. Pipe isolators shall comprise an internal rubber or neoprene material that isolates pipe from hanger and structure. Install at all piping located in acoustical walls. Refer to Architectural Drawings for location of acoustical walls.
   b. Isolation material shall be either a rubber or neoprene material that prevents contact between the pipe and the structure. The rubber shall have between a 45 to 55 durometer rating and a minimum thickness of 1/2 inch.
   c. Acceptable Suppliers:
      1) Vertical runs: Acousto-Plumb or equal.
      2) Horizontal runs: B-Line, Vibraclamp; Acousto-Plumb or equal.
8. Provide support for piping through roof, arranged to anchor piping solidly in place at the roof penetration.
9. Provide rigid insulation and a 12 inch long, 18 gauge galvanized sheet iron shield between the covering and the hanger whenever hangers are installed on the outside of the pipe covering.
10. Insulate copper tubing from ferrous materials and hangers with two thicknesses of 3 inch wide, 10 mil polyvinyl tape wrapped around pipe.
11. Provide a support or hanger close to each change of direction of pipe either horizontal or vertical and as near as possible to concentrated loads.
12. Suspend rods from concrete inserts with removable nuts where suspended from concrete decks. Power actuated inserts will not be allowed.

3.08 UNION AND FLANGE INSTALLATION

A. Install Watts, Epco, Nibco, or equal, dielectric unions or flanges at points of connection between copper or brass piping or material and steel or cast iron pipe or material except in drain, waste, vent, or rainwater piping. Bushings or couplings shall not be used. Dielectric unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.

B. Install unions in piping NPS 2” and smaller, and flanges in piping NPS 2-1/2” and larger whether shown or not at each connection to all equipment and tanks, and at all connections to all automatic valves, such as temperature control valves. Unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.

C. Locate the unions for easy removal of the equipment, tank, or valve.

3.09 ACCESS DOOR INSTALLATION

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers,

traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.10 PIPE PROTECTION

A. Wrap bare galvanized and black steel pipe buried in the ground and to 6" above grade, including piping in conduit, with one of the following, or equal:
   1. Polyethylene Coating: Pressure sensitive polyethylene coating, "X-Tru-Coat" as manufactured by Pipe Line Service Corporation or "Green Line" wrap as manufactured by Roystron Products, or equal.
      a. Field Joints and Fittings: Protecto Wrap #1170 tape as manufactured by Pipe Line Service Corporation, or Primer #200 tape by Roystron Products, or equal. Installation shall be as per manufacturer's recommendation and instructions.
   2. Tape Wrap: Pressure-sensitive polyvinyl chloride tape, "Transtex #V-l0 or V-20", "Scotchwrap 50", Slipknot l00, PASCO Specialty & Mfg., Inc., or equal, with continuous identification. Tape shall be a minimum of 20 mils thick for fittings and irregular surfaces, two wraps, 50 percent overlap, 40 mils total thickness. Tape shall be laminated with a suitable adhesive; widths as recommended by the manufacturer for the pipe size. Wrap straight lengths of piping with an approved wrapping machine.

B. Field Joints: Valves and Fittings: double wrap polyvinyl chloride tape as above. Provide at least two thicknesses of tape over the joint and extend a minimum of 4 inches over adjacent pipe covering. Build up with primer to match adjacent covering thickness. Width of tape of fittings shall not exceed 3 inches. Tape shall adhere tightly to all surfaces of the fittings without air pockets.

C. Testing: Test completed wrap of piping, including all epoxy painted piping with Tinker and Rasor Co. test machine (San Gabriel, CA - 818-287-5259), Pipeline Inspection Company (Houston, TX - 713-681-5837), or equal.

D. Cleaning: Clean all piping thoroughly before wrapping.
   1. Inspection: Damaged or defective wraps shall be repaired as directed. No wrapped pipe shall be covered until approved by Architect.

E. Sleeve copper piping/tubing installed below slab with “Polywrap-C” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping and orange for other piping. Install sleeve per manufacturer’s recommendations and instructions.

F. Sleeve copper piping/tubing installed outside building below grade with “Polywrap-C” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping. Install sleeve per manufacturer’s recommendations and instructions.

G. Sleeve cast iron and ductile iron pipe below grade and below slab with “Polywrap” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 8 mils thick, colored natural. Install sleeve per manufacturer’s recommendations and instructions.

H. Covering: No rocks or sharp edges shall be backfilled against the wrap or sleeve. When backfilling with other than sand, protect wrap with an outer wrapping of Kraft paper; leave in place during backfill.

3.11 PIPE IDENTIFICATION

A. Provide temporary identification of each pipe installed, at the time of installation. Temporary identification shall be removed and replaced with permanent identification as part of the work.

B. Apply the legend and flow arrow at all valve locations; at all points where the piping enters or leaves a wall, partition, cluster of piping or similar obstruction, at each change of direction and at approximately 20'-0" intervals on pipe runs. Variations or changes in locations and spacing may be made with the approval of the Architect. There shall be at least one marking in each room. Markings shall be located for maximum visibility from expected personnel approach.

C. Wherever two or more pipes run parallel, the markings shall be supplied in the same relative location on each.

D. Apply markings after painting and cleaning of piping and insulation is completed.

3.12 EXPANSION ANCHORS IN HARDENED CONCRETE

A. Refer to Structural Drawings.

B. Qualification Tests: The specific anchor shall have a current ICC-ES report and evaluated in cracked concrete in accordance with Acceptance Criteria AC193. If the specific anchor satisfies cyclic testing requirements per Acceptance Criteria AC01, Section 5.6, the full allowable shear and tension loads listed in the current ICC-ES report and manufacturer’s recommendations for the specific anchor may be used. Otherwise, the design shear and tension loads shall not be more than 80% of the listed allowable shear and tension loads for the specific anchor.

C. Installation: The anchors must be installed in accordance with the requirements given in ICC Research Committee Recommendations for the specific anchor.

D. Testing: Fifty percent of the anchors shall be load-tested on each job to twice the allowable capacity in tension, except that if the design load is less than 75 pounds; only one anchor in ten need be tested. If any anchor fails, all anchors must be tested. The load test shall be performed in the presence of a special inspector.

E. The load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, a torque wrench calibrated using the specific anchor or calibrated spring-loading devices. Anchors in which the torque is used to expand the anchor without applying tension to the bolt may not be verified with a torque wrench.

3.13 PIPING SYSTEM PRESSURE TESTING

A. General:
   1. Perform operational tests under simulated or actual service conditions, including one test of complete plumbing installation with fixtures and other appliances connected.
   2. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.

B. Piping Systems: Test piping systems in accordance with the following requirements and applicable codes:
   1. Authority having jurisdiction shall witness tests of piping systems.
   2. Notify Architect at least seven days in advance of testing.
   3. All piping shall be tested at completion of roughing-in, or at other times as directed by Architect.
   4. Furnish necessary materials, test pumps, gases, instruments and labor required for testing.
   5. Isolate from system equipment that may be damaged by test pressure.
   6. Make connections to existing systems with flanged connection. During testing of new work, provide a slip-in plate to restrict test pressure to new systems. Remove plate and make final connection to existing system at completion of testing.
      a. Authority having jurisdiction shall witness final connection to system.

C. Test Schedule: No loss in pressure or visible leaks shall show after four hours at the pressures indicated.

D. Testing of Sanitary Sewer, Drain, Vent, and Storm Drain may be done in segments in order to limit pressure to within manufacturer’s recommendations. Test to 10 feet above highest point in the system.

System Tested	Test Pressure PSI	Test With
Sanitary Sewer, Drain, Vent	10 Ft. Hd.	Water
Storm Drain, Condensate Drains	10 Ft. Hd.	Water
Domestic Water	125	Water
Natural Gas (PE)	60	Air & Non-corrosive Leak Test Fluid
Natural Gas (Steel)	100	Air & Non-corrosive Leak Test Fluid
Compressed Air	200 lb.	Air & Non-corrosive Leak Test Fluid
Deionized Water	50	Water

1. Flush deionized water lines with deionized water after test and approval.
2. Non-corrosive leak test fluid shall be suitable for use with piping material specified, and with the type of gas conveyed by the piping system.

3.14 TRACER WIRES

A. Provide tracer wire for non-metallic gas and water pipe in ground outside of buildings. Use AWG #14 tracer wire with low density high molecular weight polyethylene insulation, and lay continuously on pipe so that it is not broken or stressed by backfilling operations. Secure wire to the piping with tape at 18 inch intervals. Solder all joints. Tracer wire insulation shall be colored yellow for gas piping, blue for water piping.

B. Terminals: Precast concrete box and cast iron locking traffic cover, Brooks 3TL, or equal; cover marked with name of service; 6 inches of loose gravel below box. Plastic terminal board with brass bolts; identify line direction with plastic tags. Test for continuity between terminals, after backfilling, in presence of Inspector.

C. Alternate: Use electronically detectable plastic tape with metallic core, Terra Tape D, manufactured by Reef Industries, Inc., Seton, Inc., Marking Services, Inc., or equal; tape 2 inches wide, continuously imprinted "CAUTION WATER (GAS, etc.) LINE BELOW". Install, with printed side up, directly over pipe, 18 inches below finish grade. Backfill material shall be as specified for the particular condition where pipe is installed, but avoid use of crushed rock or of earth with particles larger than l/2 inch within the

top 12 inches of backfill. Take precautions to insure that tape is not damaged or misplaced during backfill operations. Terminal boxes not required.

3.15 OPERATION OF SYSTEMS

A. Do not operate any plumbing equipment for any purpose, temporary or permanent, until all of the following has been completed:
   1. Complete all requirements listed under “Check, Test and Start Requirements.”
   2. Piping has been properly cleaned. Piping systems shall be flushed and treated prior to operation.
   3. Filters, strainers etc. are in place.
   4. Bearings have been lubricated, and alignment of rotating equipment has been checked.
   5. Equipment has been run under observation, and is operating in a satisfactory manner.

B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

3.16 CHECK, TEST AND START REQUIREMENTS

A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of plumbing equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.
   1. As part of the submittal process, provide a copy of each manufacturer’s printed startup form to be used.
   2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer’s employees. See specific equipment Articles in these Specifications for this requirement.
   3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.
   4. When work has been completed, provide copies of reports for review, prior to final observation of work.

B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.

C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each operating and maintenance manual. Provide a copy of certification from the Owner’s representative indicating that

they have been properly instructed in maintenance requirements for the equipment installed.

3.17 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

A. Prior to observation to determine final acceptance, put all mechanical systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.
   1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations.
   2. Correct rotation of motors and ratings of overload heaters are verified.
   3. Specified filters are installed and spare filters have been turned over to Owner.
   4. All manufacturers' certificates of start-up specified have been delivered to the Owner.
   5. All equipment has been cleaned, and damaged painted finishes touched up.
   6. Missing or damaged parts have been replaced.
   7. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.
   8. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.
   9. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.
   10. Preliminary test and balance work is complete, and reports have been forwarded for review.
   11. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.
   12. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.

B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.
   1. Operate and test all mechanical equipment and systems for a period of at least five consecutive 8 hour days to demonstrate the satisfactory overall operation of the project as a complete unit.
   2. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment. Notify the Architect at least seven calendar days in advance of starting the above tests.
   3. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.
   4. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.

C. Review of Contractor's Tests:
   1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.

D. Test Logs:
   1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.

E. Preliminary Operation:
   1. The Owner reserves the right to operate portions of the plumbing system on a preliminary basis without voiding the guarantee.

3.18 CERTIFICATES OF INSTALLATION

A. Contractor shall complete applicable “Certificates of Installation” forms contained in the California Building Energy Efficiency Standards and submit to the authorities having jurisdiction for approval and issuance of final occupancy permit, as described in the California Energy Code.

3.19 DEMONSTRATION AND TRAINING

A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.
   1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.
   2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer’s employees. See specific equipment Articles in these Specifications for this requirement.
   3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner’s representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:
      a. Listing of Owner-designated personnel completing training, by name and title.
      b. Name and title of training instructor.
      c. Date(s) of training.
      d. List of topics covered in training sessions.
   4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

END OF SECTION

SECTION 22 10 00 - PLUMBING PIPING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Pipe and fittings.
   2. Valves.
   3. Domestic water piping specialties.
   4. Gas piping specialties.
   5. Drain and waste piping specialties.

1.02 RELATED REQUIREMENTS

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

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing piping systems materials and products.

1.04 INFORMATIONAL SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Provide welding certificate for all gas pipe welders.

C. Gas Pipe Installer Qualifications: Provide evidence of current qualifications for individuals performing work requiring qualifications.

1.05 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Maintenance Data: Submit maintenance data and parts lists for plumbing piping systems materials and products. Include this data in Operation and Maintenance Manual.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

1.07 QUALITY ASSURANCE

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Gas Pipe Installer Qualifications: Individuals performing tasks requiring qualifications under Federal and State regulations shall be qualified by the gas utility supplying Project site. The qualifications shall be current at the time of performing the Work.

C. NFPA/ANSI Compliance: Fabricate and install natural gas systems in accordance with latest edition of NFPA 54/ANSI Z223.1 "National Fuel Gas Code."

D. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

E. Fabricate and install natural gas systems in accordance with California Plumbing Code.

F. Utility Compliance: Fabricate and install natural gas systems in accordance with local gas utility company requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide materials and products complying with California Plumbing Code. Where more than one type of material or product is indicated, selection from materials or products specified is Contractor's option.

B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Plastic piping components shall be marked with "NSF-pw."

2.02 PIPE AND FITTINGS ATTACHED TO AND BELOW BUILDINGS INCLUDING 5 FEET FROM BUILDINGS

A. Piping and fittings attached to covered walkways and corridors shall comply with the requirements of this article.

B. Drain and Waste Pipe Above Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard (CISPI) 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor's option, vertical piping above floor from lavatories, sinks, and drinking fountains may be Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV weld pipe and fittings.
   1. Joints above grade: No-Hub pipe conforming to ASTM A888 and CISPI 301. Couplings conforming to ASTM 1277 and CISPI 310, with stainless steel bands. Provide products by ANACO-Husky, Tyler, Ideal or equal. Provide sway brace at 20'-0" maximum spacing for suspended pipe with No-Hub joints. Provide a brace on each side of a change in direction of 90 degrees or more. Brace riser joints at each floor and at 15 foot maximum intervals (also see Specification Section 22 00 50).
      a. HCAI Projects: Provide sway brace at each joint per CBC.

C. Drain and Waste Pipe Below Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and CISPI 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor's option, hub and spigot cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A-74 and so marked, may be used.
   1. Joints below grade: ANACO-Husky SD 4000, Clamp-All 125, or equal couplings and No-Hub fittings, meeting the requirements of FM 1680, SD Class I and ASTM C1540.
   2. Joints below grade (hub and spigot option): Neoprene gaskets conforming to ASTM C564, as manufactured by Ty-Seal, Dual-Tite, or equal.

D. Vent Pipe:
   1. 3 inch and larger: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe above grade.
   2. 2-1/2 inch and smaller: Cast iron soil pipe and fittings as specified for sizes 3 inch and larger, Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV copper pipe and fittings.
   3. Vent pipe buried in ground and to 6 inches above ground: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe below ground.

E. Type DWV copper tubing or No-Hub cast iron pipe and fittings may be used for concealed rainwater leaders. Where no-hub piping is used, the fittings and couplings shall match those used for waste piping.

F. Water Pipe (Tempered Water, Tempered Water Return, Hot Water, Hot Water Return and Cold Water): ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass. Water piping below slab: ASTM B88, Type K copper tubing, hard temper, with wrought copper fittings. At Contractor's option, pipe runs below slab having no branches may be ASTM B88, Type K annealed copper tubing without joints. See Section 22 00 50 for pipe protection requirements for below slab copper piping.

G. Temperature and Pressure Relief Valve Piping: ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass.

H. Gas Pipe: Schedule 40 black steel conforming to ASTM A53, with malleable iron threaded fittings above grade for piping 2 inch and smaller; welded piping below grade and for above grade piping larger than 2 inches, with Class 150 welding fittings.
   1. Appliance Flexible Connectors for Indoor Equipment Without External Spring Isolation:
      a. Contractor may choose one of the following:
         1) Direct gas pipe connection.
         2) Appliance flexible connector:
            a) Comply with ANSI Z21.24.
            b) Polymer or hot-dipped PVC coated corrugated 304 stainless steel.
            c) Operating-Pressure Rating: 0.5 psig.
            d) End Fittings: Zinc-coated steel.
            e) Maximum Length: 30 inches.
            f) Manufacturers: Dormont, Series 30C, 31, 40C, 41, and 51, Brasscraft model ProCoat, or equal.
      b. Provide with end connections compatible with equipment and piping system.
      c. Equipment located in spaces normally accessible to building occupants, other than maintenance personnel, shall utilize direct gas pipe connection.
      d. Provide anti-microbial PVC coating for use with appliances located in kitchen areas.
   2. Flexible Gas Connector for Outdoor Equipment Without External Spring Isolation:
      a. Contractor may choose one of the following:
         1) Direct gas pipe connection.
         2) Corrugated stainless steel hose with 304 stainless steel braid covering, CSA certified. Metraflex model GASCT, Unisource

Manufacturing series 400, or equal. Provide with end connections compatible with equipment and piping system.

3. Flexible Gas Connector for Equipment with External Spring Isolation, Indoors and Outdoors:
   a. Where Drawings indicate installation of mechanical equipment on spring isolation rails spring mounted curbs, or spring hangers, provide metal flexible connectors, Metraflex Metraloop, or equal by Unisource Mfg. Co., or Flexicraft Industries, CSA certified for 4 inches of movement in all directions.

I. Condensate Drain Piping:
   1. Inside buildings provide ASTM B88, Type L copper tubing and fittings. Provide Wye fittings with capped cleanout plug for tubing up to 1 inch size. Provide wrought or cast DWV fittings for sizes 1-1/4 inch and larger.
   2. Outside buildings provide ASTM B88, Type L copper pipe and fittings, cast iron drain pipe and fittings or Schedule 40 galvanized steel pipe and cast iron drain or vent fittings.
   3. Connect condensate drains to mechanical equipment per equipment manufacturer's recommendations; provide P-trap where required. Slope piping to drain, with 1 inch in 10 foot minimum pitch. Provide di-electric couplings or unions at connections to dissimilar materials.
   4. Where Drawings indicate installation of mechanical equipment on spring isolation rails spring mounted curbs, or spring hangers, provide threaded metal connector at mechanical equipment, Metraflex Model SST, or equal by Unisource Mfg. Co., or Flexicraft Industries. Arrange flexible connection to ensure drainage of condensate, and support flexible connection at each end of connector, to ensure proper alignment.
   5. Where condensate drain P-traps are required, install trap using Wye fitting on inlet and outlet of trap. Provide cap on top of each Wye, made removable for cleaning and inspection. Drill 1/8 inch diameter hole in cap at outlet of the trap to allow venting of the system. Minimum depth of trap should be 4 inches, or as recommended by the manufacturer in printed literature.
   6. Provide cleanout tees or “Y” at each change in direction.

J. Condensing-Type Equipment Condensate Drain Pipe: CPVC pipe and fittings conforming to ASTM D-2846.
   1. Provide CPVC condensate drain pipe for condensing water heaters, furnaces, and where shown on Drawings.
   2. Piping and fittings shall be as manufactured by Spears Manufacturing, Charlotte Pipe and foundry Co., or equal.

2.03 SITE PIPING AND FITTINGS TO 5 FEET FROM BUILDINGS

A. Buried Drain, Waste, and Vent Piping:

1. Install piping from street connection to the property line in accordance with local requirements.
2. 4 inches and larger: PVC, ASTM D3034 - SDR 35; use matching Ring Tite fittings.
3. 3 inches and smaller: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler pipe, or equal. Provide ANACO-Husky SD 4000, Clamp-All 125, or equal couplings and No-Hub fittings, meeting the requirements of FM 1680, SD Class I and ASTM C1540. Pipe and fittings shall be the product of a single manufacturer.

B. Water Service Piping:
1. Sizes 2 inches and larger (not under building): Gasket style PVC conforming to ASTM D2241-SDR21, Class 200 with gasket type fittings or ductile iron mechanical joint couplings. Gasket fittings shall be one piece injection molded PVC fittings, equal to Flo-Seal water main fittings for PVC pressure pipe, 200 psi, ASTM D-3139.
2. Sizes less than 2 inches: Type K copper tubing, hard temper, with wrought copper fittings. See Section 22 00 50 for pipe protection requirements for below grade copper piping.
3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. J.M. Eagle.
   b. P.W. Pipe.
   c. Ipex Series Pipe.

C. Water Service Piping Above Grade:
1. Sizes 3 inches and larger: Class 150 flanged ductile cast iron water pipe conforming to AWWA/ANSI C150/A21.50 and manufactured in accordance with AWWA/ANSI C151/A21.51. Fittings shall conform to AWWA/AWWA C110/A21.10, Class 250 pattern. Pipe and fittings shall have factory applied cement-mortar lining in accordance with AWWA/ANSI C104/A21.4. Flanges shall conform to ASME/ANSI B16.1.
2. Piping 2-1/2 inches and smaller: Type K copper tubing, hard temper, with brazed wrought copper fittings.

D. Gas Piping Underground: Performance Pipe, “DriscoPlex” 6500 PE 2708 (yellow), Polypipe, Inc., “Polypipe”, or equal, polyethylene gas distribution pipe, ASTM D2513, ASTM D3261, and ASTM D2683 fittings with fusion welded joints. Provide piping labeled for natural gas in accordance with CPC.
1. Electrically isolate underground ferrous gas piping from the rest of the gas system with listed or approved isolation fittings installed a minimum of six inches above grade.

2. Provide Central Plastics Corp., Perfection, or equal, anodeless, single seal riser for transition from below grade polyethylene to schedule 40 steel piping above grade. Minimum horizontal length shall be 30 inches. Minimum vertical length shall be 30 inches, or greater as required. Provide fusion connection to polyethylene pipe below grade, and screwed connection to steel pipe above grade.

E. Gas Piping Aboveground to 30 inches Belowground: Schedule 40 black steel with beveled ends for welding, with Class 150 welding fittings. Mitering to form elbows or tees will not be permitted; where branch tee connections of welded piping are required, Bonney "Weldolet" Allied Pipe Fittings, or equal fittings may be used if the branch is one-half of the diameter of the main or less.

2.04 PIPE JOINING MATERIALS

A. Refer to piping Articles in this Section for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated
   a. Full-Face Type: For flat-face, Class 125, cast iron and cast bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast iron and steel flanges.
2. AWWA C111, rubber, flat face, 1/8-inch (3.2mm) thick, unless otherwise indicated; and full-face or ring type, unless other indicated.
3. Flange Bolts and Nuts: AWWA C111, carbon steel, unless otherwise indicated.
4. Plastic, Pipe-Flange Gasket, Bolts and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, 100 percent lead free alloys. Include water-flushable flux according to ASTM B813.

D. Brazing Filler Metals: AWS A5.8, BCup-5 Series, copper-phosphorus unless otherwise indicated. Sil-Fos 15, or equal.

E. Welding Filler Metals: Comply with ASME B31.1 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.05 VALVES AND FITTINGS FOR POTABLE WATER SYSTEMS

A. General:
1. Provide valves and fittings conforming to lead-free requirements of California Health and Safety Code Section 11 68 75.
   a. Provide valves listed to NSF/ANSI 61-G or NSF/ANSI 372 for valve materials for potable-water service.

1) Exception: Main distribution gate valves above 1-1/2 inches located underground outside building are not required to conform lead-free requirements of California Health and Safety Code Section 11 68 75.

B. Gate Valves:
1. General: Furnish valves in copper lines with adapters to suit valve/line requirements.
2. 1-1/2 inches and smaller: Minimum 200 psi CWP, bronze body, threaded bonnet, rising or non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Milwaukee UP148, UP149, Nibco T-113-LF, S-113-LF, or equal.
3. 2 inches through 3 inches: Minimum 200 psi CWP, bronze body, threaded bonnet, non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Nibco T-113-LF, S-113-LF, or equal.
4. Main distribution gate valves underground outside building above 1-1/2 inches:
   a. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.
      1) Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
      2) Furnish and deliver to Owner one wrench of each size required for operating underground valves.

C. Ball Valves:
1. 2 inches and smaller: 600 psi CWP, cast bronze or brass body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T-685-80-LF, Milwaukee UPBA400, Apollo 77C-LF10, Kitz 868, or equal.

D. Swing Check Valves:
1. Minimum 200 psi CWP, bronze or brass body, suitable for regrinding, threaded ends, conforming to MSS SP-80. Milwaukee UP509, Nibco T-413LF, Kitz 822T, or equal.

E. Butterfly Valves:
1. General: Tight closing, full lug type, with resilient seat suitable for minimum working pressure of 200 psig, conforming to MSS SP-67. Bi-direction dead end service with downstream flange removed.
2. Provide valves with the following:
   a. Seats: suitable for 40 degrees F for cold water service and 250 degrees F for hot water service. Seats shall cover inside surface of body and extend over body ends.
   b. Bodies: ductile iron or cast iron.
   c. Discs: Bronze or stainless steel.
   d. Stems or Shafts: Stainless steel. Install valves with stems horizontal.

e. Control Handles: Suitable for locking in any position or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide extended necks to compensate for insulation thickness. Provide gear operator for valves 5 inches and larger.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. 2 through 12 inches: Watts Regulator Co., model DBF-03.

F. Silent Check Valves (for use on pump discharge):
1. General: Provide spring loaded check valves at pump discharge of all pumps.
   a. 2 inches and smaller: Minimum 300 psi CWP, bronze body, Apollo 61LF, Milwaukee UP548-T, or equal.

G. Calibrated Balancing Valves:
1. General: Calibrated orifice ball type rated for 400 psig maximum operating pressure and 250 degrees F. maximum operating temperature.
   a. Body: Brass.
   b. Ball: 304 Stainless Steel.
   c. Seat: Glass and Carbon filled TFE.
   d. End Connections: Threaded.
   e. Pressure Gage connections: Integral capped readout valves with internal check valves and drain port, for use with portable pressure differential meter.
   f. Handle Style: Dial, with memory stops to retain set position.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. 3 Inch and Smaller: Bell & Gossett model CB, “LF” series.

2.06 VALVES AND FITTINGS FOR NON-POTABLE WATER, COMPRESSED AIR, AND GAS SYSTEMS

A. Gate Valves:
1. 2-1/2 inches and smaller: Class150, bronze body, union bonnet, rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Hammond IB641, IB648, Nibco T-134, S-134, Milwaukee 1151, 1169, or equal.
2. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.
   a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
   b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.

B. Ball Valves:
   1. 2 inches and smaller: 600 psi CWP, 150 psi SWP, cast bronze body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T585-70, Milwaukee BA-400, Stockham T-285, or equal.
   2. 2-1/2 inches and larger: Class 150, carbon steel body, full port, two piece, stainless steel vented ball, flanged ends, and reinforced PTFE seal, conforming to MSS SP-72. Nibco F-515-CS-F-66-FS, Milwaukee F20-CS-15-F-02-GO-VB, or equal.

C. Swing Check Valves: Class 125 or 150, bronze body, suitable for regrinding, threaded ends, conforming to MSS SP-80. Stockham B-321, Milwaukee 509, Nibco T-433, or equal.

D. Butterfly Valves:
   1. General: Tight closing, full lug type, with resilient seat suitable for minimum working pressure of 200 psig, conforming to MSS SP-67. Bi-direction dead end service with downstream flange removed.
   2. Provide valves with the following:
      a. Seats: Suitable for 40 degrees F for cold water service and 250 degrees F for hot water service. Seats shall cover inside surface of body and extend over body ends.
      b. Bodies: Ductile iron or cast iron.
      c. Discs: Bronze or stainless steel.
      d. Stems or Shafts: Stainless steel.
      e. Control Handles: Suitable for locking in any position or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide extended necks to compensate for insulation thickness. Provide gear operator for valves 5 inches and larger.
   3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
      a. 2 through 12 inches: Milwaukee Valve, CL series, Nibco, Inc., Model LD2000-3, or equal.

E. Calibrated Balance Valves (Symbol CBV): Provide globe style valves for precision regulation and control rated 175 psi for sizes 2-1/2 inches through 12 inches and rated 240 psi for bronze sizes 2 inches and below. Each valve shall have two metering/test ports with internal check valves and protective caps. All valves must be equipped with visual position readout and concealed memory stops for repeatable regulation and control.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
      a. Bell & Gossett Circuit Setter Plus.
      b. Armstrong CBV.

c. Flow Design Inc. Accusetter.
d. Tour & Andersson.
e. Circuit Sensor with butterfly valve above 3 inches.
f. Illinois Series 5000 through 2 inches.

F. Flow Control Valves: Automatic pressure compensating flow control valves shall be Griswold, Flow Design, Inc., or equal.

G. Gas Shut-off Valve Above Grade:
1. 2 inches and smaller: Provide Milwaukee BB2-100, Jomar T-100NE, or equal, ball valve, CSA listed, full port.
2. Above 2 inches: Provide ReSun D-126, Key Port, or equal, CSA listed, rectangular port, full pipe area, 125 psi SWP, flanged ends. Provide T-Handle socket wrench and adapter fittings as required for operation of valves. Provide one package of spare lubricant sticks, sizes as required for valve sizes. Lubricant shall be the product recommended by valve manufacturer for use with type of gas conveyed by the piping system.
3. Provide valves same size as upstream piping. Make any reduction in size of gas piping downstream of shutoff valves.

2.07 DOMESTIC WATER PIPING SPECIALTIES

A. Hose Bibbs:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
a. Acorn Engineering Co.
b. Woodford Manufacturing Co.
2. Hose Station: Leonard THS-25-VB-CW, Symmons, or equal.

B. Wall Hydrants:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
a. Acorn Engineering Co.
b. Woodford Manufacturing Co.
c. Mifab, Inc.

C. Water Hammer Arrestors:
1. Provide water hammer arrestors conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, with nesting type bellows contained within a casing having sufficient displacement volume to dissipate the calculated kinetic energy generated in the piping system. Water hammer arrestors shall be sized for type and number of fixtures served. Provide all

stainless steel shell construction with stainless steel bellows and threaded connection to water system.

2. Water hammer arrestors shall be certified under P.D.I. Standard WH201 and by ASSE Standard 1010.
3. Select units in accordance with the requirements of Plumbing and Drainage Institute Standard P.D.I. WH201. Install above ceilings or behind wall access door at each plumbing fixture, or where plumbing fixtures are installed in groups, at each group of fixtures.
4. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. Josam Company, series 75000.
   b. Smith (Jay R.) Mfg. Co., Hydrotrol 5005-5050.
   c. Mifab, series WHB.

D. Water Filters:
1. Provide Cuno Incorporated, Aqua Pure model AP510, or equal, point of use water filters, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, in locations indicated on Drawings.
   a. Provide model AP517 filter cartridge at each location, with 5 micron rating and 2,000 gallon rating, to remove sediment, rust, scale and chlorine taste and odor from incoming water. 2 gallon per minute capacity.
   b. Provide one spare cartridge for each unit provided.

E. Potable Water Pressure-Regulating Valve:
1. Provide pressure-regulating valves, single-seated, direct-operated type, bronze body, integral strainer, complying with requirements of ASSE Standard 1003, and the lead-free requirements of California Health and Safety Code Section 11 68 75. Size for maximum flow rate and inlet and outlet pressure indicated on Drawings.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. Cla-Val Company.
   b. Watts Regulator Company.

F. Relief Valves:
1. Provide relief valves as indicated, of size and capacity as selected by Contractor for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.
2. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI A21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F, and pressure relief at 150 psi.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. Watts Regulator Company.
   b. Cash (A.W.) Valve Manufacturing Corporation.
   c. Zurn Industries, Inc.; Wilkins-Regulator Division.

G. Trap Primers:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
   a. MiFab, Inc.
   b. Precision Plumbing Products.
   c. Sioux Chief Manufacturing Company.

2.08 GAS PIPING SPECIALTIES

A. Gas Pressure Regulating Valves:
1. Provide single-stage, spring-loaded, corrosion-resistant gas pressure regulators, with die-cast aluminum or cast iron body, complying with ANSI Z21.80. Unit shall be with atmospheric vent, internal relief overpressure protection, threaded ends for 2 inches and smaller, flanged ends for 2-1/2 inches and larger. For inlet and outlet gas pressures, specific gravity, and volume flow refer to Drawings schedule.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

Size	Manufacturer/Model
1/2 inch	Elster (American, Singer) model 1213B Itron (Actaris, Slumberger, Sprague) model B42R.
3/4 thru 1-1/4inches	Elster (American, Singer) model 1813C Sensus (Ivensys, Equimeter, Rockwell) model 143-80-12 Itron (Actaris, Slumberger, Sprague) models B42R, B57R, B58R
1-1/2 thru 2 inches	Elster (American, Singer) models 1813, 1813B Sensus (Ivensys, Equimeter, Rockwell) model 243 Itron (Actaris, Slumberger, Sprague) models B43SR, B34R, B38R

2.09 DRAIN AND WASTE PIPING SPECIALTIES

A. Cleanouts:
   1. General: Install cleanouts of same diameter as pipe (4 inch maximum) in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 18 inches from building construction so as to provide sufficient space for rodding. No horizontal run over 50 feet inside buildings or 100 feet outside buildings shall be without cleanout, whether shown on Drawings or not. Provide two-way cleanouts where indicated on drawings, and where required for satisfactory use.
      a. Provide cleanouts in waste drop from each sink and urinal.
      b. Provide one wrench for each size and type of cleanout used. Turn over to Owner at completion of the project, and obtain receipt. Place receipt in Operation and Maintenance Manuals.
   2. Cleanouts in floor and in concrete sidewalks: Ducco Cast Iron with nickel bronze top, clamping collar and ABS plastic plug: Zurn ZN-1400-KC, or equal, with square or round top to suit floor construction.
   3. Cleanouts in composition floors: Zurn ZN-1400-X-DX, or equal (nickel bronze top).
   4. Cleanouts in concealed, aboveground cast-iron soil or waste lines: Zurn Z-1440A, or equal, with ABS plastic plug.

B. Floor Drains:
   1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
      a. J.R. Smith.
      b. MIFAB.
      c. Watts.
      d. Zurn.

C. Floor Sinks:
   1. Floor Sinks: Provide anchoring flange (seepage pan) at all floor sinks, and provide flashing clamp in locations where floor membrane is used. Provide cast iron "P" trap and trap primer connection at P-Trap.
   2. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
      a. J.R. Smith.
      b. MIFAB.
      c. Watts.
      d. Zurn.

D. Hopper Drains:
   1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
      a. Zurn.
      b. J.R. Smith.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.

B. Make all arrangements for the utilities required. Pay all costs involved in obtaining the services including gas service and meter, water meter, pressure reducing valve, access boxes, street work. Connect to site utilities. Verify the location of all services. No extra cost will be allowed if services are not as shown.

C. Determine sanitary sewer and storm drain location and elevation at all points of connection before installing any piping. Notify Architect immediately if indicated grades cannot be maintained.

D. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately. Do not allow piping systems to be pressurized without written consent of the Architect.

3.02 INSTALLATION OF WATER PIPING

A. Run all water piping generally level, free of traps or unnecessary bends, arranged to conform to the building requirements, and to suit clearance for other mechanical work such as ducts, flues, conduits, and other work. No piping shall be installed so as to cause unusual noise from the flow of water therein under normal conditions.

B. Provide manufactured water hammer arrestors, sized and installed in accordance with Plumbing and Drainage Institute Standard PDI WH201.
   1. Locate water hammer arrestors at every plumbing fixture, or, where fixtures are located in groups, at every group of fixtures, and as indicated on Drawings.
   2. Install water hammer arresters above accessible ceilings, or install access doors for service.

C. Install piping on room side of building insulation.

D. Check final location of rubber rings within couplings on PVC water piping with gauge or as recommended by manufacturer. Make connection to valves with cast iron adapters connected to water pipe with cast iron couplings. Furnish and install anchors or thrust blocks.

3.03 INSTALLATION OF SANITARY AND STORM DRAINAGE SYSTEMS

A. Sewer Piping: Run all horizontal sanitary drain piping inside of building on a uniform grade of not less than 1/4 inch per foot unless otherwise noted or later approved. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.

B. Run all drainage piping as straight as possible and provide easy bends with long turns; make all offsets at an angle of 45 degrees or less.

C. Grade all vent piping so as to free itself quickly of any water condensation.

D. Where possible, join groups of vent risers together with one enlarged outlet through roof. Maintain minimum of 10 foot horizontal or 3 foot vertical clearance from air intakes.

E. Hubless Cast Iron Joints: Comply with coupling manufacturer's installation instructions.

3.04 INSTALLATION OF NATURAL GAS PIPING

A. Install natural gas piping in accordance with Division 22 Basic Plumbing Materials and Methods sections.

B. Use sealants on metal gas piping threads that are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

C. Remove cutting and threading burrs before assembling piping.

D. Do not install defective piping or fittings. Do not use pipe with threads that are chipped, stripped, or damaged.

E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping or equipment connections are completed.

F. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

G. Install drip-legs in gas piping where indicated and where required by code or regulation.

1. Install "Tee" fitting with bottom outlet plugged or capped at bottom of pipe risers.
2. Where gas supply is connected to equipment with flexible connectors, install drip-leg in piping on downstream side of flexible connector, and install shut off valve on piping on upstream side of flexible connector.

H. Install piping with 1/64 inch per foot (1/8 percent) downward slope in direction of flow.

I. Install piping parallel to other piping.

J. Paint all gas piping installed in exposed exterior locations. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods, article, Painting.

K. Provide exterior shutoff valve at each building. Provide sign affixed to wall at valve location reading: “Gas Shut-Off.” Size and location of the sign shall be as required by the Authority Having Jurisdiction. Where gas piping enters a building in more than one location, exterior shutoff valves shall have a permanently attached metal tag identifying the area served by that valve, in addition to sign on wall.

L. Provide watertight Schedule 40 PVC conduit to protect gas piping installed below covered walk, covered driveways, and where noted on Drawings. Extend sleeve at least 12 inches beyond any area where it is required to be installed, and terminate with valve box extended to grade, and marked “GAS”.

3.05 PIPE JOINTS AND CONNECTIONS

A. General:
1. Cutting: Cut pipe and tubing square, remove rough edges or burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt and debris from inside and outside of pipe before assembly.
3. Boss or saddle type fittings or mechanically extracted tube joints will not be allowed.

B. Threaded Pipe: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply thread compound to external pipe threads: Rectorseal No. 5, Permatex No. 1, or equal.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

C. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

D. Copper Pipe and Tubing (Except pneumatic control piping): All joints shall be brazed according to ASME Section IX, Welding and Brazing Qualifications, except domestic water piping 1-1/4 inches and smaller when not buried in the ground or concrete and type DWV plumbing piping may be soldered.
   1. Soldered joints: Apply water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828.

E. Cast Iron Soil Pipe:
   1. No-Hub fittings shall be made with a torque wrench.
   2. Hub joints shall be with Ty-Seal couplings.
   3. Wrought iron, steel, or copper pipe shall have a ring or part of a coupling screwed on to form a spigot end if caulked into a joint.
   4. Connect cast iron sewer piping to outside service pipe with cast iron or vitrified LOP reducers or increasers as required. Caulking of smaller pipe into the larger without a reducer or increaser will not be permitted.

F. Welded Pipe:
   1. Make up with oxyacetylene or electric arc process.
   2. All line welds shall be of the single "V" butt type. Welds for flanges shall be of the fillet type.
   3. Where the branch is two pipe sizes smaller than the main or smaller, Bonney Weldolets, Threadolets, Nibco, or equal, may be used in lieu of welding tees.

G. PVC Sewer and Drainage Pipe (outside building as allowed only): Four inches and larger shall be bell and spigot, assembled in accordance with manufacturer's recommendations. Joint shall be tested in accordance with ASTM D3212. Solvent weld joints below 4 inches in size, schedule 40 PVC with matching fittings, assembled per manufacturer’s instructions.

H. Polyethylene and Polypropylene Pipe: Assemble with fusion joints in strict accordance with manufacturer's instructions.

I. Flexible Connections:
   1. Furnish and install Thermo Tech., Inc. F/J/R, Metraflex, or equal, flexible couplings with limiter bolts on piping connections to all equipment mounted on anti-vibration bases, on each connection to each base mounted pump and where shown. Couplings shall be suitable for pressure and type of service.
   2. Anchor piping securely on the system side of each flexible connection.

3.06 INSTALLATION OF VALVES

A. Install valves as indicated on Drawings and in the following locations:
   1. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
   2. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each

rise or drop in piping system, and elsewhere indicated or required to completely drain potable water system.

3. Provide gate or globe valves on inlet and outlet of each water heater or pump.

B. General:
1. Valves shall be full line size unless indicated otherwise on Drawings.
2. Install horizontal valves with valve stem above horizontal, except butterfly valves.
3. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
4. Locate valves for easy access and provide separate support where necessary.
5. Install valves in position to allow full stem movement.
6. Install exposed polished or enameled connections with special care showing no tool marks or exposed threads.
7. Butterfly valves conforming to the paragraph “Butterfly Valves” may be used in lieu of gate or globe valves for locations above grade.
8. Ball valves conforming to the paragraph “Ball Valves” may be used in lieu of gate valves for locations above grade for services 2-1/2 inches and smaller.
9. Valves 2-1/2 inches and smaller (except ball valves) in nonferrous water piping systems may be solder joint type with bronze body and trim.
10. Rigidly fasten hose bibbs, hydrants, fixture stops, compressed air outlets, and similar items to the building construction.

C. Gate Valves:
1. Furnish valves in copper lines with adapters to suit valve / line requirements.
2. Underground gate valves:
   a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
   b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.

D. Swing Check Valves: Install in horizontal position with hinge pin level.

E. Butterfly Valves: Install with stems horizontal.

F. Silent Check Valves: Install in horizontal or vertical position between flanges.

G. Calibrated Balancing Valves: Install calibrated balancing valves per manufacturers’ recommendations, including requirements for straight pipe lengths at valve inlet and outlet.

H. Gas Shut-Off Valves:
1. Provide line size ball valve in gas line to each appliance.

I. Valve Adjustment: Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.07 INSTALLATION OF CLEANOUTS

A. Cleanouts: Install in piping as indicated, as required by California Plumbing Code, at each change in direction of piping greater than 45 degrees. Install at maximum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping inside buildings, and at base of each conductor.

B. Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through water resistant membrane.

3.08 INSTALLATION OF FLOOR DRAINS AND FLOOR SINKS

A. Install drains in accordance with manufacturer's written instructions and in locations indicated. Install floor drains with lip of drain slightly below finished floor to ensure drainage. Install floor sinks flush with finished floor. Coordinate with other trades to ensure that floor slopes to drain. Provide flashing flange and clamping device with each drain passing through water resistant membrane.

B. Install vented P-trap below each drain. Where trap primers are indicated, install trap primer connection in the P-trap.

3.09 INSTALLATION OF HOPPER DRAINS

A. Install hopper drain in wall, in sheet metal box, with access door.
   1. Size access door and box to suit the size required for hopper drain and trap primer, and solder all seams of box. Seal all penetrations to box with non-hardening waterproof sealant. Provide locking door in occupied spaces.

B. Grind top and sides of funnel, if required, to suit wall thickness.

3.10 TRAP PRIMER INSTALLATION

A. Install as indicated in manufacturers printed literature, with 1/2 inch, Type L, hard copper piping to trap primer connection on floor drains and floor sinks where indicated on Drawings. At Contractor’s option, Type K annealed copper tubing without joints may be used be used below slab only. See Section 22 00 50 for pipe protection requirements for below slab copper piping/tubing.

B. Install trap primer piping with 1/4 inch per foot slope, to insure that the line will drain fully to the floor drain or floor sink.
   1. Provide ball valve to the inlet at each trap primer location.

C. Install trap primer and distribution unit exactly as called for in manufacturers printed installation instructions. Connect to domestic water piping from the top of the water line, in order to prevent foreign material from entering directly into primer assembly.

D. Mount trap primer in wall, in sheet metal box, with Karp or equal access door. Size access door and box to suit valve operation, and solder all seams of box. Seal all penetrations to box with non-hardening waterproof sealant. Provide locking door where installed in occupied spaces.

E. Where one trap primer will be used for more than one trap, provide a distribution unit with feeder piping for a maximum of four traps sized for equal pressure drop to each trap.

3.11 INSTALLATION OF GAS PRESSURE REGULATING VALVES

A. Install as indicated; comply with utility requirements. In locations where regulators are installed in confined spaces, pipe atmospheric vent to outdoors, full size of outlet. Install gas shutoff valve upstream and downstream of each pressure-regulating valve.

3.12 GAS PIPING EQUIPMENT CONNECTIONS

A. Connect gas piping to each gas-fired equipment item, with union, drip leg and shutoff gas cock full size of supply line shown. Reduce only at connection to equipment. Comply with equipment manufacturer's instructions.
   1. Route gas vent and gas relief to outside.
   2. Gas shutoff valve shall be placed as close as possible to equipment in a location where it can be serviced. Distance from equipment to valve shall not exceed 6 feet.

3.13 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated.

B. Mechanical Equipment Connections: Connect hot and cold water piping system and gas piping system to mechanical equipment as indicated, and provide with shutoff valve and union for each connection.

3.14 DOMESTIC WATER SYSTEM STERILIZATION

A. Clean and disinfect new or altered hot and cold water piping connected to domestic water systems using methods prescribed by the Health Authority. If the Health Authority does not prescribe methods, clean and disinfect new or altered hot and cold water piping using methods given in the California Plumbing Code.
   1. A water treatment company that has a current state EPA license to apply disinfectant chlorine in potable water shall perform the procedure.

3.15 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Remove labels from stainless steel sinks, except 316 stainless steel sink labels should be retained to confirm that the correct material has been provided. Leave systems and equipment in satisfactory operating condition.

3.16 OPERATIONAL TESTS

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.17 TESTING AND BALANCING

A. See Section 23 05 93 of Specifications for testing and balancing requirements.

3.18 CLEANING UP

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Water supplies and stops.
2. Plumbing fixture hangers and supports.
3. Refrigerator ice maker outlet boxes.

1.02 RELATED REQUIREMENTS

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

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished.

1.04 INFORMATIONAL SUBMITTALS

A. Refer to Section 22 00 50, Basic Plumbing Materials and Methods.

1.05 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Plumbing Fixture Standards: Comply with applicable portions of the following codes and requirements for all work in this Section:
   1. California Building Code – CBC
   2. California Plumbing Code – CPC
   3. California Health and Safety Code
   4. American National Standards Institute - ANSI
   5. Federal Standards - F.S.
   6. National Sanitary Foundation – NSF International

C. ANSI Standards: Comply with ANSI/NSF 61, “Drinking Water System Components – Health Effects.”

D. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.

E. Americans with Disabilities Act (ADA).

F. California Green Building Standards Code Requirements:

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES

A. General: Provide factory fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete, installation. Where more than one type is dedicated, selection is Contractor's option; but, all fixtures of same type must be furnished by single manufacturer.
   1. Take special care with the roughing-in and finished plumbing where batteries of fixtures occur.
   2. Take location and mounting heights for roughing-in from Architectural Drawings.
   3. Follow schedule on Plumbing Drawings for roughing-in connections. Set roughing-in for all fixtures exactly as per measurements furnished by the manufacturers of the fixtures used.
   4. Roughing-in for lavatories and sinks shall be brought in through the wall under the centerline of the drain from the fixture wherever possible and as close to the fixture as possible.

2.02 MATERIALS

A. Provide materials that have been selected for their surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.

B. Where fittings, trim and accessories are exposed or semi-exposed, provide, chromium plated 17 gauge seamless brass and match faucets and fittings. Provide 17 gauge seamless copper or brass where not exposed.

C. Handles on all faucets and stops shall be all metal chromium plated.

D. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.

2.03 PLUMBING FITTINGS, TRIM AND ACCESSORIES

A. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and as required to operate as indicated.
   1. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shut-down of water supply piping systems.

B. P-Traps: Include IAPMO approved removable P-traps where drains are indicated for direct connection to drainage system. P-Traps shall be less trap screw cleanout, and incorporate a chrome plated cast brass body, brass connection nuts, 17 gauge seamless brass wall return and chrome plated wall escutcheon to match trap finish.

C. Carriers: Provide cast iron supports for fixtures of graphitic gray iron, ductile iron, or malleable iron as indicated. Where the carrier for wall mounted water closets are installed more than 6 inches behind the finished wall, provide water closet support for wide pipe chase.

D. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

E. Escutcheons: Where fixture supplies and drains penetrate walls in exposed location, provide chrome-plated cast brass escutcheons with setscrews.

F. Aerators: Provide aerators of types approved by Health Departments having jurisdiction. Delete aerators where not allowed by CPC for health care occupancies.

G. Comply with additional fixture requirements contained in Fixture Schedule shown on the drawings.

2.04 MANUFACTURERS

A. In accordance with California Plumbing Code, provide indelibly marked or embossed manufacturers name or logo, arranged so as to be visible after installation.

B. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
   1. Vitrified China Plumbing Fixtures:
      a. American Standard, U.S. Plumbing Products.
      b. Eljer Plumbingware Div., Wallace-Murray Corp.
      c. Kohler Co.
      d. VitrA.
   2. Modular Lavatories:
      a. Bradley.
      b. Acorn.
      c. Willoughby Industries, Inc.
   3. Plumbing Trim:
      a. McGuire Manufacturing Co., Inc.
      b. Delta Commercial.
      c. Chicago Faucet Co.
      d. T&S Brass and Bronze Works, Inc.
   4. Flush Valves:
      a. Sloan Valve Co.
      b. Zurn Industries, Hydromechanics Div.
      c. Toto USA, Inc.
   5. Faucets:
      a. Chicago Faucet Co.
      b. Symmons Scott.
      c. T&S Brass and Bronze Works, Inc.
      d. Delta Commercial.
   6. Fixture Seats:
      a. Church Seat Co.
      b. Bemis Mfg. Co.
      c. Beneke Corp.
   7. Service Sinks:
      a. American Standard.
      b. Kohler Co.
      c. Williams Serviceptor.
      d. Florestone.
      e. Acorn.
   8. Stainless Steel Sinks:
      a. Elkay Mfg. Co.
      b. Just Mfg. Co.
      c. Haws Corporation.
   9. Fixture Carriers:
      a. Josam Mfg. Co.
      b. J. R. Smith.
      c. Tyler Pipe; Wade Div.
      d. Zurn Industries; Hydromechanics Div.

e. Mifab, Inc.

2.05 FLUSH VALVE REQUIREMENTS

A. Metering flush valves where required and specified shall be non-hold open type with exposed parts chrome plated. Conform to all codes and manufacturers' recommendations. All diaphragms are to have multiple filtered bypass and be chloramine resistant synthetic rubber with internal components suitable for l80 degree hot water to l50 pounds pressure, plastic or leather diaphragm not acceptable.

B. Electronic flush valves where required and specified shall be non-hold open type with exposed parts chrome plated. Conform to all codes and manufacturers' recommendations. All diaphragms are to have multiple filtered by pass and be chloramine and resistant synthetic rubber with rubber and internal components suitable for 180 degree hot water to 150 pounds pressure, plastic or leather diaphragm not acceptable. All flush valve solenoids and sensors shall be UL listed.

2.06 FIXTURE CONNECTIONS

A. Make connection between fixtures and flanges on soil pipe absolutely gastight and watertight with neoprene type gaskets (wall hung fixtures) or bowl wax (floor outlet fixtures). Rubber gaskets or putty will not be permitted.

B. Provide fixtures not having integral traps with P-traps of chromium-plated 17 gauge cast brass, with 17 gauge seamless brass wall return, connected to concealed waste in wall and sanitary fittings. Provide IAPMO approval for trap, and provide less trap screw cleanout.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. Dearborn Brass, Commercial series with brass nuts.
   b. Delta Commercial.
   c. McGuire Manufacturing Co., Inc.

C. Connections from stacks or horizontal wastes to wall or floor finish for wastes from lavatories, urinals, sinks, and drinking fountains and connection between floor drains and traps shall be IPS 85 percent red brass pipe.

D. Unions on waste pipes on fixture side of traps may be slip or flange joints with soft rubber or lead gaskets. Traps shall rough in full size to waste and vent connection, using deep escutcheon plate to cover wall penetration. Compression adaptor extensions or sweat adaptors are not acceptable.

2.07 WATER SUPPLIES AND STOPS

A. Provide 85 percent IPS threaded red brass nipple, conforming to the lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have stop valves installed on water supply lines.

B. Provide water supplies to fixtures with compression shut-off stops with threaded inlets and lock shield-loose key handles. Provide combination fixtures with compression stop and threaded inlet on each water supply fitting. Provide lock shield-loose key handle for each stop.

C. Provide 1/2 inch riser tubes with reducing coupling for fixtures, unless otherwise noted.

D. Provide cast brass escutcheon.

E. Furnish shut-off valves on hose bibbs where directly connected to mains with no intervening valves.

F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   1. McGuire Manufacturing Company, Inc., model LFH2167LK.
   2. T & S Brass and Bronze Works, Inc., model B-1305.

2.08 PLUMBING FIXTURE HANGERS AND SUPPORTS

A. Floor-affixed supports for off-the-floor plumbing fixtures shall comply with ASME A112.6.1M.

B. Residential type fixture supports are not acceptable.

C. Install wall mounted water closets with combination support and waste fittings, with feet of support securely anchored to floor.

D. Install floor mounted water closets with J.R. Smith, Zurn, or equal government pattern cast iron closet flanges with brass bolts, nuts, washers, and porcelain caps secured with Spackle.

E. Install the following fixtures on concealed support with feet of support securely anchored to floor. Anchor top of support to wall construction in an approved manner.
   1. Wall hung lavatories.
   2. Wall mounted urinals.
   3. Drinking fountains.
   4. Electric water coolers.

2.09 PLUMBING FIXTURES

A. Install all plumbing fixtures at height indicated on Architectural Drawings. Where mounting height is not indicated, install at height required by Code.

B. Special Requirements For Accessible Fixtures:
   1. Operating handle or valve for accessible water closets, urinals, lavatories, and sinks shall operate with less than 5 pounds force. Metering faucets shall be adjusted to operate between 10 and 15 seconds.
   2. Insulate exposed waste piping and domestic water supplies below accessible fixtures with CBC access code compliant molded “closed-cell” vinyl covers. Covers shall be installed using vandal resistant fasteners and must be removable. Covers shall meet flame spread rating not to exceed 25 and smoke density not to exceed 50 when tested in accordance with ASTM E-84, and shall comply with the requirements of California Code of Regulations, Title 24. Plumberex – Handy Shield, Johns Manville – Zeston 2000, or equal.

C. Refrigerator Ice Maker Outlet Boxes:
   1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
      a. Guy Gray.
      b. Water-Tite.

PART 3 - EXECUTION

3.01 PRODUCT HANDLING AND PROTECTION

A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

3.02 PREPARATORY PROVISIONS

A. The Contractor is responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section. Do not proceed until all unsatisfactory conditions have been corrected. Commencing work will be construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.03 INSPECTION AND PREPARATION

A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of

plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the National Standard Plumbing Code pertaining to installation of plumbing fixtures.

C. Fasten plumbing fixtures securely to supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies to blocking behind or within wall construction so as to be rigid, and not subject to pull or push movement.

D. Install CBC accessible fixtures in accordance with Chapter 4 California Plumbing Code, and Chapters 11A and 11B California Building Code.

E. Refer to Division 26 for wiring for electronic flush valves.

3.04 FAUCET INSTALLATION

A. Provide 85 percent IPS red brass pipe, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to faucets, stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have a stop valve installed on water supply lines to permit repairs without shutting off water mains.

B. Adjust metering faucets to run for 10 to 15 seconds.

3.05 CLEAN AND PROTECT

A. Clean plumbing fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during the remainder of the construction period.

C. Grout voids between all fixtures and adjacent surfaces with white Dow Silicone Sealant, arranged to shed water.

3.06 FIELD QUALITY CONTROL

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

3.07 EXTRA STOCK

A. General: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every ten units.

END OF SECTION

SECTION 22 50 00 - PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. SECTION INCLUDES
   1. Instantaneous electric water heaters.

1.02 RELATED REQUIREMENTS

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

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Product Data: Submit manufacturer's plumbing equipment specifications, installation and start-up instructions, capacity and ratings, with selection points clearly indicated.

1.04 INFORMATIONAL SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

1.05 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Maintenance Data: Submit maintenance data and parts lists for each item of plumbing equipment. Include "trouble-shooting" maintenance guides. Include this data in Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Trade names or catalog numbers stated herein indicates grade or quality of materials desired.

C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.

D. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.

E. Pump types and sizes regulated by the US Department of Energy's "Energy Conservation Standards for Pumps" 10 CRF Parts 429 and 431 shall be marked with a compliant PEI_{CL} or PEI_{VL} (Pump Energy Index, constant or variable load) value, basic model number, and RPM on the nameplate. Regulated pumps shall be listed in the Hydraulic Institute (HI) Energy Rating database (er.pumps.org) and be assigned an Energy Rating as defined in the HI 40.5 program guide.

F. CEC Compliance: Comply with California Electrical Code (Title 24, Part 3) as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.

G. ASME Relief Valve Stamps: Provide water heaters with safety relief valves bearing ASME valve markings.

H. ASME Code Symbol Stamps: For the following equipment, comply with ASME Boiler and Pressure Vessel Code for construction, and stamp with ASME Code symbol:
   1. Water Heaters 200 MBH and greater.

I. California Energy Commission Compliance: Provide written confirmation of listing of all water heaters in the "Appliance Efficiency Database."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

PART 2 - PRODUCTS

2.01 MATERIALS

A. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.

B. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.02 INSTANTANEOUS ELECTRIC WATER HEATERS

A. General: Wall mounted, microprocessor-controlled, electric heating style.

B. Standard: UL 499 for electric, tankless, (domestic-water heater) heating appliance.

C. Construction: Copper piping or tubing complying with NSF 61 and NSF 372 barrier materials for potable water, without storage capacity.
1. Connections: ASME B1.20.1 pipe thread.
2. Pressure Rating: 150 psig .
3. Heating Element: Resistance heating system.
4. Temperature Control: Flow-control fitting.
5. Safety Control: High-temperature-limit cutoff device or system
6. Jacket: Aluminum or steel with enameled finish or plastic.

D. Support: Bracket for wall mounting.

E. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Chronomite Laboratories, Inc.
2. Eemax, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The Contractor shall be responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section and shall not proceed until all unsatisfactory conditions have been corrected. Commencing work shall be construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.02 ELECTRIC WATER HEATER INSTALLATION

A. Install electric water heaters as indicated, in accordance with manufacturer's installation instructions and in compliance with applicable codes.

B. Furnish wiring diagram to Electrical Installer. Refer to Division 26 for wiring of units, not work of this section.

C. Connect to hot and cold water lines with shutoff valve, check valve, and dielectric union in the cold water line, and ASME standard pressure and temperature relief valve and dielectric union in the hot water line. Connect drain and relief piping as noted on Drawings.

D. Start-up, test, and adjust electric water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.

E. After installation has been completed, seal bottom of heaters without feet to floor with silicone sealer.

3.03 DEMONSTRATION AND TRAINING

A. Provide a minimum of 8 hours of training and orientation of Owners staff in proper care and operation of Plumbing Equipment.

3.04 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Leave systems and equipment in satisfactory operating condition.

3.05 OPERATIONAL TESTS

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.06 CLEANING UP

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 23 00 50 - BASIC HVAC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Electric motors.
   2. Strainers.
   3. Access Doors.
   4. Flexible joints.

1.02 RELATED REQUIREMENTS

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

B. This Section is a part of each Division 23 Section.

C. Refer to Section 23 08 00.13, T-24 Commissioning of HVAC for Title 24 commissioning requirements.

1.03 ADDITIONAL REQUIREMENTS

A. Furnish and install incidental work not shown or specified necessary to provide a complete and workable system.

B. Make all temporary connections required to maintain services, including adequate heat and cooling, during the course of the Contract without additional cost to Owner. Notify Owner seven days in advance before disrupting services.

C. Provide for adjustments or modifications to fan and motor sheaves, belts, damper linkages, and other components as required to achieve specified air balance at no additional cost to Owner.

1.04 REFERENCES AND STANDARDS

A. Where material or equipment is specified to conform to referenced standards, it shall be assumed that the most recent edition of the standard in effect at the time of bid shall be used.
   1. AABC - Associated Air Balance Council
   2. AFBMA - Anti Friction Bearing Manufacturer's Association
   3. AMCA - Air Moving and Control Association Inc.
      a. Standard 210 - Laboratory Methods of Testing Fans

4. ANSI - American National Standards Institute
5. ARI - Air-Conditioning and Refrigeration Institute
6. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
7. ASME - American Society of Mechanical Engineers
8. ASTM - American Society for Testing and Materials
9. CCR - California Code of Regulations
   a. Title 8 - Division of Industrial Safety, Subchapter 7; General Industry Safety Orders, Articles 31 through 36
10. CSA – Canadian Standards Association International
11. CSFM - California State Fire Marshal
12. NCPWB - National Certified Pipe Welding Bureau
13. NIST - National Institute of Standards and Technology
14. NEMA - National Electrical Manufacturers' Association
15. NFPA - National Fire Protection Association
16. OSHA - Occupational Safety and Health Act
17. SMACNA - Duct Manuals
18. UL - Underwriters' Laboratories, Inc.

B. Requirements of Regulatory Agencies:
   1. The publications listed below form part of this specification; comply with provisions of these publications except as otherwise shown or specified.
      a. California Building Code, 2022.
      b. California Electrical Code, 2022.
      c. California Energy Code, 2022.
      d. California Fire Code, 2022.
      e. California Green Building Standards Code, 2022.
      f. California Mechanical Code, 2022.
      g. California Plumbing Code, 2022.
      h. California Code of Regulations, Title 24.
      i. California Health and Safety Code.
      j. CAL-OSHA.
      k. California State Fire Marshal, Title 19 CCR.
      l. National Fire Protection Association.
      m. Occupational Safety and Health Administration.
      n. Other applicable state laws.
   2. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes, or to requirements of authorities having jurisdiction. It is not the intent of Drawings or specifications to repeat requirements of codes except where necessary for clarity.

1.05 DRAWINGS

A. Examine Drawings prior to bidding of work and report discrepancies in writing to Architect.

B. Drawings showing location of equipment and materials are diagrammatic and job conditions will not always permit installation in location shown. The HVAC Drawings show general arrangement of equipment and materials, etc., and shall be followed as closely as existing conditions, actual building construction, and work of other trades permit.
   1. Architectural and Structural Drawings shall be considered part of the Work. These Drawings furnish Contractor with information relating to design and construction of the Project. Architectural Drawings take precedence over HVAC Drawings.
   2. Because of the small scale of HVAC Drawings, not all offsets, fittings, and accessories required are shown. Investigate structural and finish conditions affecting the Work and arrange Work accordingly. Provide offsets, fittings, and accessories required to meet conditions. Inform Architect immediately when job conditions do not permit installation of equipment and materials in the locations shown. Obtain the Architects approval prior to relocation of equipment and materials.
   3. Relocate equipment and materials installed without prior approval of the Architect. Remove and relocate equipment and materials at Contactors' expense upon Architects' direction.
   4. Minor changes in locations of equipment, piping, ducts, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.

C. Execute work mentioned in the Specifications and not shown on the Drawings, or vice versa, the same as if specifically mentioned or shown in both.

1.06 FEES AND PERMITS

A. Obtain and pay for permits and service required in installation of the Work. Arrange for required inspections and secure approvals from authorities having jurisdiction. Comply with requirements of Division 01.

B. Arrange for utility connections and pay charges incurred, including excess service charges.

C. Coordination:
   1. General:
      a. Coordinate HVAC Work with trades covered in other Specifications Sections to provide a complete, operable and sanitary installation of the highest quality workmanship.
   2. Have fire damper and fire smoke damper installation instructions available at Project site during construction for use by Project Inspector.
   3. Electrical Coordination:

a. Refer to the Electrical Drawings and Specifications, Division 26, for service voltage and power feed wiring for equipment specified under this section. Contractor has full responsibility for the following items of work:
   1) Review the Electrical Drawings and Division 26 Specifications to verify that electrical services provided are adequate and compatible with equipment requirements.
   2) If additional electrical services are required above that indicated on Electrical Drawings and in Division 26, such as more control interlock conductors, larger feeder, or separate 120 volt control power source, include cost to furnish and install additional electrical services as part of the bid.
   3) Prior to proceeding with installation of additional electrical work, submit detailed drawings indicating exact scope of additional electrical work.

4. Mechanical Coordination:
   a. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to accommodate mechanical system installation.
   b. Coordinate installation of supporting devices. Set sleeves in poured-in-place concrete and other structural components during construction.
   c. Coordinate requirements for access panels and doors for mechanical items requiring access where concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section “Access Doors and Frames.”
   d. Coordinate with other trades equipment locations, pipe, duct and conduit runs, electrical outlets and fixtures, air inlets and outlets, and structural and architectural features. Provide information on location of piping and seismic bracing to other trades as required for a completely coordinated project.

1.07 SUBMITTALS - GENERAL

A. Refer to Division 01 Submittals Section(s) for additional requirements.

B. Submittal packages may be submitted via email as PDF electronic files, or as printed packages. PDFs shall be legible at actual size (100 percent). Provide seven copies of printed submittal packages.

C. Provide submittal of materials proposed for use as part of this Project. Product names in Specifications and on Drawings are used as standards of quality. Furnish standard items on specified equipment at no extra cost to the Contract regardless of disposition of submittal data. Other materials or methods shall not be used unless approved in writing by Architect. Architect's review will be required even though "or equal" or synonymous terms are used.
   1. Partial or incomplete submittals will not be considered.
   2. Quantities are Contractor's responsibility and will not be reviewed.
   3. Provide materials of the same brand or manufacturer for each class of equipment or material.

4. Identify each item by manufacturer, brand, trade name, number, size, rating, or other data necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.
5. Identify each submittal item by reference to items' Specification Section number and paragraph, by Drawing and detail number, and by unit tag number.
6. Organize submittals in same sequence as in Specification Sections.
7. Show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, and weight.
    a. Submit Shop Drawings, performance curves, and other pertinent data, showing size and capacity of proposed materials.
    b. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of Contract Documents.
    c. Drawings shall be drawn to scale and dimensioned (except schematic diagrams). Drawings may be prepared by vendor but must be submitted as instruments of Contractor, thoroughly checked and signed by Contractor before submission to Architect for review.
    d. Catalog cuts and published material may be included with supplemental scaled drawings.

D. Review of submittals will be only for general conformance with design concept and general compliance with information given in Contract Documents. Review will not include quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with work of other trades, or construction safety precautions, which are sole responsibility of Contractor. Review of a component of an assembly does not indicate acceptance of an assembly. Deviations from Contract Documents not clearly identified by Contractor are Contractor's responsibility and will not be reviewed by Architect.

E. Within reasonable time after award of contract and in ample time to avoid delay of construction, submit to Architect shop drawings or submittals on all items of equipment and materials provided. Provide submittal as a complete package.
    1. Shop drawings and submittals shall include Specification Section, Paragraph number, and Drawing unit symbol or detail number for reference. Organize submittals into booklets for each Specification section and submit in loose-leaf binders with index. Deviations from the Contract Documents shall be prominently displayed in the front of the submittal package and referenced to the applicable Contract requirement.

F. Furnish to the Project Inspector complete installation instructions on material and equipment before starting installation.

1.08 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing systems materials and products.

B. Shop Drawings.

C. Sustainable Design Submittals:
1. Product Data: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.
2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.

1.09 INFORMATIONAL SUBMITTALS

A. Provide coordinated layouts for HVAC Ductwork systems, in accordance with Specification Section 23 80 00.

B. Provide evidence of equipment certification to California Energy Code Section 110.1 or 110.2, if not providing Electrically Commutated motors for HVAC fans sized below 1 hp and above 1/12 hp. Refer to specific equipment articles requiring electrically commutated motors.

C. Check, Test, and Start forms, from equipment manufacturers.

D. Check, Test and Start reports.

1.10 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
1. Furnish three complete sets of Operation and Maintenance Manual bound in hardboard binder, and one compact disc containing complete Operation and Maintenance Manual in searchable PDF format. Provide Table of Contents. Provide index tabs for each piece of equipment in binder and disc. Begin compiling data upon approval of submittals.
a. Sets shall incorporate the following:
1) Product Data.
2) Shop Drawings.
3) Record Drawings.
4) Service telephone number, address and contact person for each category of equipment or system.
5) Complete operating instructions for each item of heating, ventilating and air conditioning equipment.
6) Copies of guarantees/warrantees for each item of equipment or systems.
7) Test data and system balancing reports.

8) Typewritten maintenance instructions for each item of equipment listing lubricants to be used, frequency of lubrication, inspections required, adjustment, etc.
9) Manufacturers' bulletins with parts numbers, instructions, etc., for each item of equipment.
10) Temperature control diagrams and literature.
11) Check test and start reports for each piece of mechanical equipment provided as part of the Work.
12) Commissioning and Preliminary Operation Tests required as part of the Work.

2. Post service telephone numbers and addresses in an appropriate place designated by Architect.

B. Record Drawings:
1. Refer to Division 01 for additional requirements.
2. Upon completion of the Work, deliver to Architect the following:
a. Originals of drawings showing the Work exactly as installed.
b. One complete set of reproducible drawings showing the Work exactly as installed.
c. One compact disc with complete set of drawings in PDF format showing the Work exactly as installed.
d. Provide Contractor’s signature, verifying accuracy of record drawings.
e. Obtain the signature of the Inspector of Record for Record Drawings.

1.11 SUBSTITUTIONS

A. Refer to Division 01 for complete instructions. Requirements given below are in addition to or are intended to amplify Division 01 requirements. In case of conflict between requirements given herein and those of Division 01, Division 01 requirements shall apply.

B. It is the responsibility of Contractor to assume costs incurred because of additional work and or changes required to incorporate proposed substitute into the Project. Refer to Division 01 for complete instructions.

C. Substitutions will be interpreted to be manufacturers other than those specifically listed in the Contract Documents by brand name, model, or catalog number.

D. Only one request for substitution will be considered for each item of equipment or material.

E. Substitution requests shall include the following:
1. Reason for substitution request.
2. Complete submittal information as described herein; see “Submittals.”
3. Coordinated scale layout drawings depicting position of substituted equipment in relation to other work, with required clearances for operation, maintenance and replacement.

4. List optional features required for substituted equipment to meet functional requirements of the system as indicated in Contract Documents.
5. Explanation of impact on connected utilities.
6. Explanation of impact on structural supports.

F. Installation of reviewed substitution is Contractors' responsibility. Any mechanical, electrical, structural, or other changes required for installation of substituted equipment or material must be made by Contractor without additional cost to Owner. Review by Architect of substituted equipment or material, will not waive these requirements.

G. Contractor may be required to compensate Architect for costs related to substituted equipment or material.

1.12 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of HVAC systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with HVAC systems work similar to that required for this Project.

C. Comply with applicable portions of California Mechanical Code pertaining to selection and installation of HVAC materials and products.

D. All materials and products shall be new.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Protect equipment and materials delivered to Project site from weather, humidity and temperature variations, dirt, dust and other contaminants.

1.14 FIELD CONDITIONS

A. Contractor shall visit Project site and examine existing conditions in order to become familiar with Project scope. Verify dimensions shown on Drawings at Project site. Bring discrepancies to the attention of Architect. Failure to examine Project site shall not constitute basis for claims for additional work because of lack of knowledge or location of hidden conditions that affect Project scope.

B. Information on Drawings relative to existing conditions is approximate. Deviations from Drawings necessary during progress of construction to conform to actual conditions shall be approved by the Architect and shall be made without additional cost to the Owner. The Contractor shall be held responsible for damage caused to existing services. Promptly notify the Architect if services are found which are not shown on Drawings.

1.15 WARRANTY

A. Refer to Division 01 for warranty requirements, and duration and effective date of Contractor's Standard Guarantee.

B. Repair or replace defective work, material, or part that appears within the warranty period, including damage caused by leaks.

C. On failure to comply with warranty requirements within a reasonable length of time after notification is given, Architect/Owner shall have repairs made at Contractor's expense.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials or equipment of the same type shall be of the same brand wherever possible. All materials shall be new and in first class condition.

B. All sizes, capacities, and efficiency ratings shown are minimum, except that gas capacity is maximum available.

C. Refer to Division 22 10 00 and 23 80 00 for specific system piping materials.

2.02 MATERIALS

A. No material installed as part of this Work shall contain asbestos.

B. California Green Building Code Compliance:
1. HVAC and refrigeration equipment shall not contain CFCs.
2. HVAC and refrigeration equipment shall not contain Halons.

2.03 ELECTRIC MOTORS

A. General Motor Requirements: Comply with NEMA MG 1 unless otherwise indicated. Comply with IEEE 841 for severe-duty motors.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
a. U.S. Motors.
b. Century Electric.
c. General Electric.
d. Lincoln.
e. Gould.

B. Motor Characteristics: Designed for continuous duty at ambient temperature of 40 deg. C and at altitude of 3300 feet above sea level. Capacity and torque shall be sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
   1. Motors exceeding the nameplate amperage shall be promptly replaced at no cost to the Owner. Horsepower shown is minimum and shall be increased as necessary to comply with above requirements. Furnish motors with splash-proof or weatherproof housings, where required or recommended by the manufacturer. Match the nameplate voltage rating with the electrical service supplied. Check Electrical Drawings. Provide a transformer for each motor not wound specifically for system voltage.

C. Polyphase Motors: NEMA MG 1, Design B, medium induction motor, premium efficiency as defined in NEMA MG 1. Select motors with service factor of 1.15. Provide motor with random-wound, squirrel cage rotor, and permanently lubricated or regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading. Temperature rise shall match insulation rating. Provide Class F insulation.
   1. Multispeed motors shall have separate windings for each speed.

D. Polyphase Motors with Additional Requirements:
   1. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
   2. Motors Used with Variable Frequency Controllers:
      a. Separately Connected Motors: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
      b. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
      c. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
      d. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
      e. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
      f. Each motor shall be provided with a shaft grounding device for stray current protection.
   3. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

E. Single-Phase Motors:
   1. Select motors with service factor of 1.15.
   2. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
      a. Permanent-split capacitor.
      b. Split phase.
      c. Capacitor start, inductor run.

d. Capacitor start, capacitor run.

3. Motors for HVAC exhaust, transfer, and supply fans larger than 1/12 hp and smaller than 1 hp shall be the following:
   a. Electronically Commutated motor (EC type): Motor shall be electronically commutated type specifically designed for applications, with heavy duty ball bearings. The motor shall be speed controllable down to 20% of full speed and 85% efficient at all speeds.
      1) Exceptions:
         a) Motors in fan-coils and terminal units that operate only when providing heating to the space served.
         b) Motors installed in space conditioning equipment certified under California Energy Code Section 110.1 or 110.2.
4. Contractor's Option: Motors scheduled on Drawings as single-phase, and larger than 1/12 hp and smaller than 1 hp, for applications other than HVAC fans, may be EC type.
5. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
6. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
7. Motors 1/20 HP and Smaller: Shaded-pole type.
8. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.04 STRAINERS

A. Charles M. Bailey #100A, Armstrong, Muessco, or equal, Fig. 11 "Y" pattern, 125 psi WP minimum, with monel screens with 20 square mesh for 2 inches and smaller and 3/64 inch perforations for 2-1/2 inches and larger. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.

2.05 ACCESS DOORS

A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.
   1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.

B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.

C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.

D. Where panels are located on ducts or plenums, provide neoprene gaskets to prevent air leakage, and use frames to set door out to flush with insulation.

E. Provide insulated doors where located in internally insulated ducts or casings.

F. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.

G. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.

H. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:
   1. Milcor
      a. Style K (plaster).
      b. Style DW (gypsum board).
      c. Style M (Masonry).
      d. Style "Fire Rated" where required.

2.06 FLEXIBLE JOINTS

A. Where indicated on Drawings, provide Metraflex Metrasphere, Style R, Mason Industries, or equal, Spherical Expansion Joints. Provide control units at each expansion joint, arranged to limit both expansion and compression.

B. Flexible joints at entry points to building shall be Barco Ductile iron, Advanced Thermal Systems, or equal, threaded style with stainless ball and mineral filled seal.

2.07 PIPE GUIDES

A. Where flexible connections are indicated on Drawings, provide Metraflex style IV, B-Line, or equal, pipe guides in locations recommended by manufacturer. Maximum spacing from flexible connection to first pipe guide is 4 pipe diameters, and maximum spacing from second pipe guide is 14 pipe diameters.

2.08 EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

2.09 PIPE IDENTIFICATION

A. Identify each piping system and indicate the direction of flow by means of Seton, Inc., Marking Services Inc., Reef Industries, Inc., or equal, pre-tensioned, coiled semi-rigid plastic pipe labels formed to circumference of pipe, requiring no fasteners or adhesive for attachment to pipe.

B. The legend and flow arrow shall conform to ASME A13.1.

PART 3 - EXECUTION

3.01 EXISTING MATERIALS:

A. Remove existing equipment, piping, wiring, construction, etc., which interferes with Work of this Contract. Promptly return to service upon completion of work in the area. Replace items damaged by Contractor with new material to match existing.

B. Removed materials which will not be re-installed and which are not claimed by Owner shall become the property of Contractor and shall be removed from the Project site. Consult Owner before removing any material from the Project site. Carefully remove materials claimed by Owner to prevent damage and deliver to Owner-designated storage location.

C. Existing piping and wiring not reused and are concealed in building construction may be abandoned in place and all ends shall be capped or plugged. Remove unused piping and wiring exposed in Equipment Rooms or occupied spaces. Material shall be removed from the premises. Disconnect power, water, gas, pump or any other active energy source from piping or electrical service prior to abandoning in place.

3.02 FRAMING, CUTTING, AND PATCHING

A. Special framing, recesses, chases and backing for Work of this Section, unless otherwise specified, are covered under other Specification Sections.

B. Contractor is responsible for placement of pipe sleeves, hangers, inserts, supports, and location of openings for the Work.

C. Cutting, patching, and repairing of existing construction to permit installation of equipment, and materials is the responsibility of Contractor. Repair or replace damage to existing work with skilled mechanics for each trade.

D. Cut existing concrete construction with a concrete saw. Do not utilize pneumatic devices.

E. Core openings through existing construction for passage of new piping and conduits. Cut holes of minimum diameter to suit size of pipe and associated insulation installed.

Coordinate with building structure, and obtain Structural Engineer's approval prior to coring through existing construction.

3.03 MECHANICAL DEMOLITION

A. Refer to Division 01 Sections “Cutting and Patching” and “Selective Demolition” for general demolition requirements and procedures.

B. Disconnect, dismantle and remove mechanical systems, equipment, and components indicated to be removed. Coordinate with all other trades.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping to remain with same or compatible piping material. Refrigerant system must be evacuated per EPA requirements.
   3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and cap remaining ducts with same or compatible ductwork material.
   4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
   5. Equipment to Be Removed: Drain down and cap remaining services and remove equipment.
   6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.04 ELECTRICAL REQUIREMENTS

A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.

B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIR with factory-wired strip heaters in each starter enclosure and temperature control panel where required to inhibit condensation.

C. All line voltage and low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.05 PIPING SYSTEM REQUIREMENTS

A. Drawing plans, schematic and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

3.06 PRIMING AND PAINTING

A. Perform priming and painting on the equipment and materials as specified herein.

B. See Division 09 Painting Section(s) for detailed requirements.

C. Priming and painting:
1. Exposed ferrous metals, including piping, which are not galvanized or factory-finished shall be primed and painted.
a. Black Steel Piping:
1) Primer: One coat gray Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, comparable products by Rust-Oleum, Kelly Moore, or equal.
2) Topcoat: Two coats gray Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane Enamel, comparable products by Rust-Oleum, Kelly Moore, or equal.
b. Interior Ductwork: Refer to Division 09 Painting Section(s). Architect shall select paint color.
2. Metal surfaces of items to be jacketed or insulated except ductwork and piping shall be given two coats of primer unless furnished with equivalent factory finish. Items to be primed shall be properly cleaned by effective means free of rust, dirt, scale, grease and other deleterious matter and then primed with the best available grade of zinc rich primer. After erection or installation, all primed surfaces shall be properly cleaned of any foreign or deleterious matter that might impair proper bonding of subsequent paint coatings. Any abrasion or other damage to the shop or field prime coat shall be properly repaired and touched up with the same material used for the original priming.
3. Where equipment is provided with nameplate data, the nameplate shall be masked off prior to painting. When painting is completed, remove masking material.

3.07 EXCAVATING

A. Perform all excavating required for work of this Section. Provide the services of a pipe/cable locating service prior to excavating activities to determine location of existing utilities.

B. Unless shown otherwise, provide a minimum of 2'-6" cover above top of pipe to finished grade for all service piping, unless otherwise noted. Trim trench bottom by hand or provide a 4 inch deep minimum bed of sand to provide a uniform grade and firm support throughout entire length of pipe. For all PVC pipe and for PE gas pipe, bed the pipe in 4 inch sand bed. Pipe bedding materials should be clean crushed rock, gravel or sand of which 100 percent will pass a 1 inch sieve. For pipes that are larger than 10 inches in diameter, at least 95 percent should pass a 3/4 inch sieve, and for pipes 10 inches in diameter or smaller, 100 percent should pass a 1/2 inch sieve. All other materials should have a minimum sand equivalent of 50. Only a small proportion of the native soils will meet these requirements without extensive processing; therefore, importation of pipe bedding materials should be anticipated. Pipe bedding materials shall be compacted in lifts not exceeding 6 inches in compacted thickness. Each lift shall be compacted to not less than 90 percent relative compaction at or above the optimum moisture content, in accordance with ASTM Specification D2940, except that bedding materials graded such 100 percent of the material will pass a No. 200 sieve shall be compacted in 6 inch lifts using a single pass of a flat-plate, vibratory compactor or vibratory drum. Pipe bedding materials should extend at least to the spring line.

C. Maintain all warning signs, barricades, flares, and red lanterns as required.

D. For all trenches 5 feet or more in depth, submit copy of permit detailed drawings showing shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trenches. Obtain a permit from the Division of Industrial Safety prior to beginning excavations. A copy of the permit shall be available at the site at all times.

3.08 BACKFILLING

A. Backfill shall comply with applicable provisions of Division 31 of these Specifications.

B. Except under existing or proposed paved areas, walks, roads, or similar surfaces, backfill for other types of pipe shall be made using suitable excavated material or other approved material. Place backfill in 8 inch layers, measured before compaction, and compact with impact hammer to at least 90 percent relative compaction per ASTM D2940.
   1. Backfill plastic pipe and insulated pipe with sand for a minimum distance of 12 inches above the top of the pipe. Compact using mechanical tamping equipment.

C. Entire backfill for excavations under existing or proposed pavements, walks, roads, or similar surfaces, under new slabs on grade, shall be made with clean sand compacted with mechanical tamping equipment vibrator to at least 90 percent relative compaction per ASTM D2940. Remove excess earth. Increase the minimum compaction within the uppermost two feet of backfill to 95 percent.

D. Replace or repair to its original condition all sod, concrete, asphalt paving, or other materials disturbed by the trenching operation. Repair within the guarantee period as required.

3.09 UNION AND FLANGE INSTALLATION

A. Install Epco, Nibco, or equal, dielectric unions or flanges at points of connection between copper or brass piping or material and steel or cast iron pipe or material except in drain piping. Bushings or couplings shall not be used.

B. Install unions in piping NPS 2” and smaller 3 or flanges in piping NPS 2-1/2” and larger whether shown or not at each connection to all equipment and tanks, and at all connections to all automatic valves, such as temperature control valves.

C. Locate the unions for easy removal of the equipment, tank, or valve.

D. Do not install unions or flanges in refrigerant piping systems.

3.10 ACCESS DOOR INSTALLATION

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers, traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.11 CONCRETE WORK

A. Concrete work required for work of this Section shall be included under another section of the Specification, unless otherwise noted, including poured-in-place concrete work for installing precast manholes, catch basins, etc., and shall include reinforced concrete bases for pumps, tanks, compressors, fan units, boilers, unless the work is specifically indicated on the Drawings to be furnished under this Section.

B. Underground anchors, and pads for valve access boxes are included under this Section of the Specification. Concrete shall be 3000 psi test minimum. Refer to Division 03 for concrete types.

3.12 PIPE PROTECTION

A. Wrap bare galvanized and black steel pipe buried in the ground and to 6" above grade, including piping in conduit, with one of the following, or equal:
   1. Polyethylene Coating: Pressure sensitive polyethylene coating, "X-Tru-Coat" as manufactured by Pipe Line Service Corporation or "Green Line" wrap as manufactured by Roystron Products, or equal.
      a. Field Joints and Fittings: Protecto Wrap #1170 tape as manufactured by Pipe Line Service Corporation, or Primer #200 tape by Roystron Products, or equal. Installation shall be as per manufacturer's recommendation and instructions.
   2. Tape Wrap: Pressure-sensitive polyvinyl chloride tape, "Transtex #V-l0 or V-20", "Scotchwrap 50", Slipknot l00, PASCO Specialty & Mfg., Inc., or equal, with

continuous identification. Tape shall be a minimum of 20 mils thick for fittings and irregular surfaces, two wraps, 50 percent overlap, 40 mils total thickness. Tape shall be laminated with a suitable adhesive; widths as recommended by the manufacturer for the pipe size. Wrap straight lengths of piping with an approved wrapping machine.

B. Field Joints: Valves and Fittings: double wrap polyvinyl chloride tape as above. Provide at least two thicknesses of tape over the joint and extend a minimum of 4 inches over adjacent pipe covering. Build up with primer to match adjacent covering thickness. Width of tape of fittings shall not exceed 3 inches. Tape shall adhere tightly to all surfaces of the fittings without air pockets.

C. Testing: Test completed wrap of piping, including all epoxy painted piping with Tinker and Rasor Co. holiday detector, or equal.

D. Cleaning: Clean all piping thoroughly before wrapping.
1. Inspection: Damaged or defective wraps shall be repaired as directed. No wrapped pipe shall be covered until approved by Architect.

E. Covering: No rocks or sharp edges shall be backfilled against the wrap. When backfilling with other than sand, protect wrap with an outer wrapping of Kraft paper; leave in place during backfill.

3.13 EXPANSION ANCHORS IN HARDENED CONCRETE

A. Qualification Tests: The specific anchor shall have a current ICC-ES report and evaluated in cracked concrete in accordance with Acceptance Criteria AC193. If the specific anchor satisfies cyclic testing requirements per Acceptance Criteria AC01, Section 5.6, the full allowable shear and tension loads listed in the current ICC-ES report and manufacturer’s recommendations for the specific anchor may be used. Otherwise, the design shear and tension loads shall not be more than 80% of the listed allowable shear and tension loads for the specific anchor.

B. Installation: The anchors must be installed in accordance with the requirements given in ICC Research Committee Recommendations for the specific anchor.

C. Testing: Fifty percent of the anchors shall be load-tested on each job to twice the allowable capacity in tension, except that if the design load is less than 75 pounds; only one anchor in ten need be tested. If any anchor fails, all anchors must be tested. The load test shall be performed in the presence of a special inspector.

D. The load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, a torque wrench calibrated using the specific anchor or calibrated spring-loading devices. Anchors in which the torque is used to expand the anchor without applying tension to the bolt may not be verified with a torque wrench.

3.14 PIPING SYSTEM PRESSURE TESTING

A. General:
   1. Perform operational tests under simulated or actual service conditions.
   2. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.

B. Piping Systems: Test the installations in accordance with the following requirements and applicable codes:
   1. Notify the Architect at least seven days in advance of testing.
   2. Authority having jurisdiction shall witness tests of piping systems.
   3. Piping shall be tested at completion of roughing-in, or at other times as directed by the Architect.
   4. Furnish necessary materials, test pumps, gases, instruments and labor required for testing.
   5. Isolate from system equipment that may be damaged by test pressure.
   6. Make connections to existing systems with flanged connection. During testing of new work, provide a slip-in plate to restrict test pressure to new systems. Remove plate and make final connection to existing system at completion of testing.
      a. Authority having jurisdiction shall witness final connection to system.

C. Test Schedule: No loss in pressure or visible leaks shall show after four hours at the pressures indicated.

System Tested	Test Pressure PSI	Test With
All Hot, Chilled, Combination, Condenser Water Piping	Greater of 1-1/2 x WP or 100 psi	Water

D. Testing, Evacuating, Charging and Lubrication of Refrigeration Systems:
   1. Pressurize with dry nitrogen and/or refrigerant to 300 psig and test all joints with an electronic detector or halide torch. Release the pressure and attach a high vacuum pump. Evacuate to 4 mm (4000 microns) and hold for 30 minutes. Break to 5 psig with dry nitrogen and allow to remain in the system for ten minutes. Evacuate to 2 mm (2000 microns) and hold for 30 minutes. Use a mercury manometer or electronic vacuum gauge. Do not start timing until recommended vacuum range is reached.
   2. At the end of the evacuation, if the system has been proved leak-free, charge with refrigerant and fill the crankcase to the oil level specified by the manufacturer. All refrigerant oil shall be delivered to the location in sealed containers.
   3. Replenish for a period of one year without cost to the Owner all refrigerant and oil required to maintain the proper levels.

3.15 TRACER WIRE INSTALLATION

A. Provide tracer wire for non-metallic water pipe in ground outside of buildings. Use AWG #14 tracer wire with blue colored low density high molecular weight polyethylene insulation, and lay continuously on pipe so that it is not broken or stressed by backfilling operations. Secure wire to the piping with tape at 18 inch intervals. Solder all joints.

B. Terminals: Precast concrete box and cast iron locking traffic cover, Brooks 3TL, or equal; cover marked with name of service; 6 inches of loose gravel below box. Plastic terminal board with brass bolts; identify line direction with plastic tags. Test for continuity between terminals, after backfilling, in presence of Inspector.

C. Alternate: Use electronically detectable plastic tape with metallic core, Terra Tape D, manufactured by Reef Industries, Inc., Seton, Inc., Marking Services, Inc., or equal; tape 2 inches wide, continuously imprinted "CAUTION WATER (GAS, etc.) LINE BELOW". Install, with printed side up, directly over pipe, 18 inches below finish grade. Backfill material shall be as previously specified for the particular condition where pipe is installed, but avoid use of crushed rock or of earth with particles larger than l/2 inch within the top 12 inches of backfill. Take precautions to insure that tape is not damaged or misplaced during backfill operations. Terminal boxes not required.

3.16 OPERATION OF SYSTEMS

A. Do not operate any mechanical equipment for any purpose, temporary or permanent, until all of the following has been completed:
   1. Complete all requirements listed under “Check, Test and Start Requirements.”
   2. Ductwork and piping has been properly cleaned. Piping systems shall be flushed and treated prior to operation.
   3. Filters, strainers etc. are in place.
   4. Bearings have been lubricated, and alignment of rotating equipment has been checked.
   5. Equipment has been run under observation, and is operating in a satisfactory manner.

B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

C. Operate every fire damper, smoke damper, combination smoke and fire damper under normal operating conditions. Activate smoke detectors as required to operate the damper, stage fan, etc. Provide written confirmation that all systems operate in a satisfactory manner.

3.17 TEMPORARY HEAT

A. The General Contractor will provide for all temporary heat at such times as may be required or directed by the Architect and pay all fuel and energy costs incurred.

B. Temporary heating facilities proposed for use by the Contractor will be subject to review of the Architect. Prior to use of any equipment for temporary heat, install temporary filters on all return air inlets, to preclude dust and construction debris from entering the duct system. In addition, install filters in air handling units, and replace at the completion of temporary operation.

C. Filters used for temporary operation of systems shall be as specified for permanent filters specified herein.

D. Comply with Check, Test and Start Requirements for start-up of equipment prior to operation for temporary heat.

E. Contractor shall complete the permanent heating system as soon as possible, thereby making it available for temporary heat. When available, the system may be used as required at the direction of the Architect after systems are properly prepared for use as specified elsewhere. Contractor shall then be responsible for operating the system during periods required and the General Contractor shall pay the fuel and energy costs incurred. Operation of the heating system prior to the filing of "notice of completion" shall not change the Guarantee provisions in any way.

3.18 CHECK, TEST AND START REQUIREMENTS

A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of mechanical equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.
   1. As part of the submittal process, provide a copy of each manufacturer’s printed startup form to be used.
   2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer’s employees. See specific equipment Articles in these Specifications for this requirement.
   3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.
   4. When work has been completed, provide copies of reports for review, prior to final observation of work.

B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.

C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each Operation and Maintenance Manual. Provide a copy of certification from the Owner's representative indicating that they have been properly instructed in maintenance requirements for the equipment installed.

3.19 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

A. Prior to observation to determine final acceptance, put HVAC, plumbing, and fire protection systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.
   1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations, including modulating power exhausts if present.
   2. Correct rotation of motors and ratings of overload heaters are verified.
   3. Specified filters are installed and spare filters have been turned over to Owner.
   4. All manufacturers' certificates of start-up specified have been delivered to the Owner.
   5. All equipment has been cleaned, and damaged painted finishes touched up.
   6. Damaged fins on heat exchangers have been combed out.
   7. Missing or damaged parts have been replaced.
   8. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.
   9. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.
   10. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.
   11. Preliminary test and balance work is complete, and reports have been forwarded for review.
   12. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.
   13. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.

B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.
   1. Operate and test all mechanical equipment and systems for a period of at least five consecutive 8 hour days to demonstrate the satisfactory overall operation of the project as a complete unit.
   2. Include operation of heating and air conditioning equipment and systems for a period of not less than two 8 hour days at not less than 90 percent of full specified heating and cooling capacities in tests.

3. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment. Notify the Architect at least seven calendar days in advance of starting the above tests.
4. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.
5. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.

C. Before handing over the system to Owner replace all filters with complete new set of filters.

D. Review of Contractor's Tests:
1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.

E. Test Logs:
1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.

F. Preliminary Operation:
1. The Owner reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee.

G. Operational Tests:
1. Before operational tests are performed, demonstrate that all systems and components are complete and fully charged with operating fluid and lubricants.
2. Systems shall be operable and capable of maintaining continuous uninterrupted operation during the operating and demonstration period. After all systems have been completely installed, connections made, and tests completed, operate the systems continuously for a period of five working days during the hours of a normal working day.
3. This period of continuous systems operation may be coordinated with the removal of Volatile Organic Compounds (VOCs) from the building prior to occupancy should the Owner decide to implement such a program.
4. Control systems shall be completely operable with settings properly calibrated and adjusted.
5. Rotating equipment shall be in dynamic balance and alignment.
6. If the system fails to operate continuously during the test period, the deficiencies shall be corrected and the entire test repeated.

H. Pre-Occupancy Building Purge:

1. Prior to occupancy, ventilate the building on 100 percent outside air, 100 percent exhaust for a continuous period determined by a qualified industrial hygienist (engaged by the Contractor) to reduce V.O.C's prior to occupancy.
2. Submit report by the industrial hygienist verifying satisfactory completion of the pre-occupancy purge.

3.20 DEMONSTRATION AND TRAINING

A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.
   1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.
   2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.
   3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner's representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:
      a. Listing of Owner-designated personnel completing training, by name and title.
      b. Name and title of training instructor.
      c. Date(s) of training.
      d. List of topics covered in training sessions.
   4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Balancing Air Systems:
      a. Constant-volume air systems.
   2. Balancing Domestic Water Piping Systems.

1.02 RELATED REQUIREMENTS

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

1.03 REFERENCES AND STANDARDS

A. Associated Air Balance Council (AABC)
   1. National Standards for Total System Balance, latest edition.

1.04 DEFINITIONS

A. The intent of this Section is to use the standards pertaining to the TAB specialist engaged to perform the Work of this Contract, with additional requirements specified in this Section. Contract requirements take precedence over corresponding AABC or NEBB standards requirements. Differences in terminology between the Specifications and the specified TAB organization standards do not relieve the TAB entity engaged to perform the Work of this Contract of responsibility from completing the Work as described in the Specifications.

B. Similar Terms: The following table is provided for clarification only:

Similar Terms		
Contract Term	AABC Term	NEBB Term
TAB Specialist	TAB Agency	NEBB Certified Firm
TAB Standard	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems	Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
TAB Field Supervisor	Test and Balance Engineer	Test and Balance Supervisor

C. AABC: Associated Air Balance Council.

D. TAB: Testing, adjusting, and balancing.

E. TAB Organization: Body governing practices of TAB Specialists.

F. TAB Specialist: An entity engaged to perform TAB Work.

1.05 ACTION SUBMITTALS

A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.

B. LEED Submittals:
1. Air-Balance Report for Prerequisite IEQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
2. TAB Report for Prerequisite EA 2: Documentation of work performed for ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.06 INFORMATIONAL SUBMITTALS

A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.

B. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
1. Provide list of similar projects completed by proposed TAB field supervisor.

2. Provide copy of completed TAB report, approved by mechanical engineer of record for a completed project with similar system types and of similar complexity.

C. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
1. Submit examinations report with qualifications data.

D. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

E. Interim Reports. Submit interim reports as specified in Part 3. Include list of system conditions requiring correction and problems not identified in Contract Documents examination report.

F. Certified TAB reports.
1. Provide three printed copies of final TAB report. Provide one electronic file copy in PDF format.

G. Sample report forms.

H. Instrument calibration reports, to include the following:
1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.
a. Instruments to be used for testing and balancing shall have been calibrated within a period of one year, or less if so recommended by instrument manufacturer and be checked for accuracy prior to start of work.

1.07 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.

B. Certified TAB reports, for inclusion in Operation and Maintenance Manual.

1.08 QUALITY ASSURANCE

A. Independent TAB Specialist Qualifications: Engage a TAB entity certified by AABC.
1. The certification shall be maintained for the entire duration of TAB work for this Project. If TAB specialist loses certification during this period, the Contractor shall immediately notify the Architect and submit another TAB specialist for approval. All work specified in this Section and in other related Sections performed by the

TAB specialist shall be invalidated if the TAB specialist loses certification, and shall be performed by an approved successor.

B. To secure approval for the proposed TAB specialist, submit information certifying that the TAB specialist is either a first tier subcontractor engaged and paid by the Contractor, or is engaged and paid directly by the Owner. TAB specialist shall not be affiliated with any other entity participating in Work of this Contract, including design, furnishing equipment, or construction. In addition, submit evidence of the following:
   1. TAB Field Supervisor: Full-time employee of the TAB specialist and certified by AABC.
      a. TAB field supervisor shall have minimum 10 years supervisory experience in TAB work.
   2. TAB Technician: Full-time employee of the TAB specialist and who is certified by AABC as a TAB technician.
      a. TAB technician shall have minimum 4 years TAB field experience.

C. TAB Specialist engaged to perform TAB work in this Project shall be a business limited to and specializing in TAB work, or in TAB work and Commissioning.

D. TAB specialist engaged to perform TAB work shall not also perform commissioning activities on this Project.

E. Certified TAB field supervisor or certified TAB technician shall be present at the Project site at all times when TAB work is performed.
   1. TAB specialist shall maintain at the Project site a minimum ratio of one certified field supervisor or technician for each non-certified employee at times when TAB work is being performed.

F. Contractor shall notify Architect in writing within three days of receiving direction resulting in reduction of test and balance scope or other deviations from Contract Documents. Deviations from the TAB plan shall be approved in writing by the mechanical engineer of record for the Project.

G. TAB Standard:
   1. Perform TAB work in accordance with the requirements of the standard under which the TAB agencies' qualifications are approved unless Specifications contain different or more stringent requirements:
      a. AABC National Standards for Total System Balance
   2. All recommendations and suggested practices contained in the TAB standard are mandatory. Use provisions of the TAB standard, including checklists and report forms, to the extent to which they are applicable to this Project.
   3. Testing, adjusting, balancing procedures, and reporting required for this Project, and not covered by the TAB standard applicable to the TAB specialist engaged to perform the Work of this Contract, shall be submitted for approval by the design engineer.

H. TAB Conference: Meet with Architect and mechanical engineer on approval of the TAB strategies and procedures plan to develop a mutual understanding of the project requirements. Require the participation of the TAB field supervisor. Provide seven days' advance notice of scheduled meeting time and location. TAB conference shall take place at location selected by Architect offices of Capital.
   1. Agenda Items:
      a. The Contract Documents examination report.
      b. The TAB plan.
      c. Coordination and cooperation of trades and subcontractors.
      d. Coordination of documentation and communication flow, including protocol for resolution tracking and documentation.
   2. The requirement for TAB conference may be waived at the discretion of the mechanical engineer of record for the Project.

I. Certify TAB field data reports and perform the following:
   1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
   2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

J. TAB Report Forms: Use standard TAB specialist's forms approved by Architect.

K. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

L. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

M. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.09 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.10 WARRANTY

A. Provide workmanship and performance warranty applicable to TAB specialist engaged to perform Work of this Contract:
   1. AABC Performance Guarantee.

B. Refer to Division 01 Specifications for additional requirements.

1.11 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

C. Coordinate TAB work with work of other trades.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Contract Documents Examination Report:
   1. TAB specialist shall review Contract Documents, including plans and specifications. Provide report listing conditions that would prevent the system(s) from operating in accordance with the sequence of operations specified, or would prevent accurate testing and balancing:
      a. Identify each condition requiring correction using equipment designation shown on Drawings. Provide room number, nearest building grid line intersection, or other information necessary to identify location of condition requiring correction.
      b. Proposed corrective action necessary for proper system operation.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves.
   1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

L. Examine system pumps to ensure absence of entrained air in the suction piping.

M. Examine operating safety interlocks and controls on HVAC equipment.

N. Report conditions requiring correction discovered before and during performance of TAB procedures.

O. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures. TAB plan shall be specific to Project and include the following:
   1. General description of each air system and sequence(s) of operation.
   2. Complete list of measurements to be performed.
   3. Complete list of measurement procedures. Specify types of instruments to be utilized and method of instrument application.
   4. Qualifications of personnel assigned to Project.
   5. Single-line CAD drawings reflecting all test locations (terminal units, grilles, diffusers, traverse locations, etc.
   6. Air terminal correction factors for the following:
      a. Air terminal configuration.
      b. Flow direction (supply or return/exhaust).
      c. Effective area of each size and type of air terminal.
      d. Air density.

B. Complete system-readiness checks and prepare reports. Verify the following:
   1. Permanent electrical-power wiring is complete.
   2. Automatic temperature-control systems are operational.
   3. Equipment and duct access doors are securely closed.
   4. Balance, smoke, and fire dampers are open.

5. Isolating and balancing valves are open and control valves are operational.
6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
   1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
   1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
   2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 23 07 13 "Duct Insulation," Section 23 07 16 "HVAC Equipment Insulation," Section 23 80 00 Heating, Ventilating, and Air Conditioning."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Test each system to verify building or space operating pressure, including all stages of economizer cycle. Maximum building pressure shall not exceed 0.03 inches of pressure.

C. Except as specifically indicated in this Specification, Pitot tube traverses shall be made of each duct to measure airflow. Pitot tubes, associated instruments, traverses, and techniques shall conform to ASHRAE Handbook, HVAC Applications, and ASHRAE Handbook, HVAC Systems and Equipment.
   1. Use state-of-the-art instrumentation approved by TAB specialists governing agency..

2. Where ducts' design velocity and air quantity are both less than 1000 fpm/CFM, air quantity may be determined by measurements at terminals served.

D. Test holes shall be placed in straight duct, as far as possible downstream from elbow, bends, take-offs, and other turbulence-generating devices.

E. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

F. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

G. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

H. Verify that motor starters are equipped with properly sized thermal protection.

I. Check dampers for proper position to achieve desired airflow path.

J. Check for airflow blockages.

K. Check condensate drains for proper connections and functioning.

L. Check for proper sealing of air-handling-unit components.

M. Verify that air duct system is sealed as specified in Section 23 31 13 "Metal Ducts." Section 23 80 00 “Heating, Ventilating, and Air Conditioning.”

N. Provide for adjustments or modifications to fan and motor sheaves, belts, damper linkages, and other components as required to achieve specified air balance at no additional cost to Owner.

O. Automatically operated dampers shall be adjusted to operate as indicated in Contract Documents. Controls shall be checked for proper calibration.

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
1. Measure total airflow.
a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow. Alternative methods shall be examined for determining total CFM, i.e., Pitot-tube traversing of branch ducts, coil or filter velocity profiles, prior to utilizing airflow values at terminal outlets and inlets.
2. Measure fan static pressures as follows to determine actual static pressure:

a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
b. Measure static pressure directly at the fan outlet.
c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
   a. Report the cleanliness status of filters and the time static pressures are measured.
4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Check operation of relief air dampers. Measure total relief air quantity at each stage of normal, economizer, power exhaust, or power exhaust economizer operation, as applicable to installed equipment. Adjust relief air dampers to provide 100 percent relief in economizer mode. Ensure that relief dampers close completely upon unit shutdown.

C. Check operation of outside air dampers. Measure total outside air quantity at each stage of normal, economizer, power exhaust, or power exhaust economizer operation, as applicable to installed equipment. Adjust outside air dampers to provide 100 percent outside air in economizer mode. Ensure that outside air dampers close completely upon unit shutdown.

D. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
   1. Measure airflow of submain and branch ducts.
      a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

E. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading digital backflow compensating hood. Use outlet manufacturer's written instructions and calculating factors only when direct-reading hood cannot be used due to physical obstruction or other limiting factors. Final report shall indicate where values listed have not been obtained by direct measurement.

F. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents, if included.
2. Adjust patterns of adjustable outlets for proper distribution without drafts. Terminal air velocity at five feet above finished floor shall not exceed 50 feet per minute in occupied air conditioned spaces.

G. Do not overpressurize ducts.

3.06 PROCEDURES FOR HEAT EXCHANGERS

A. Measure water flow through all circuits.

B. Adjust water flow to within specified tolerances.

C. Measure inlet and outlet water temperatures.

D. Measure inlet steam pressure.

E. Check settings and operation of safety and relief valves. Record settings.

3.07 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.

6. Nameplate and measured amperage, each phase.
7. Starter manufacturer's name, model number, size, type, and thermal-protection-element rating.
    a. Starter strip heater size, type, and rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.08 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

3.09 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each electric heating coil:
1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperature at full load.
4. Voltage and amperage input of each phase at full load and at each incremental stage.
5. Calculated kilowatt at full load.
6. Fuse or circuit-breaker rating for overload protection.

B. Measure, adjust, and record the following data for each refrigerant coil:
1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.

3.10 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the condition of filters.
4. Check the condition of coils.

5. Check the operation of the drain pan and condensate-drain trap.
6. Check bearings and other lubricated parts for proper lubrication.
7. Report on the operating condition of the equipment and the results of the measurements taken. Report conditions requiring correction.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Conditions requiring correction noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.11 GENERAL PROCEDURES FOR PLUMBING SYSTEMS

A. Measure pressure drop across each backflow preventer assembly at design flows.

B. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:
1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
a. If impeller sizes must be adjusted to achieve pump performance, obtain approval from Architect Owner Construction Manager Commissioning Authority and comply with requirements in Section 22 50 00 “Plumbing Equipment Section 22 11 23 "Domestic Water Pumps."

2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
   a. Monitor motor performance during procedures and do not operate motors in overload conditions.
3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
4. Report flow rates that are not within range given in article, Tolerances.

C. Set calibrated balancing valves, if installed, at calculated presettings.

D. Measure flow at all stations and adjust, where necessary, to obtain first balance.
1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

E. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

F. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
1. Determine the balancing station with the highest percentage over indicated flow.
2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
3. Record settings and mark balancing devices.

G. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.

H. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.

I. Check settings and operation of each safety valve. Record settings.

3.12 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: 10%.
2. Air Outlets and Inlets: 5.
3. Multiple outlets within single room: 5 for total airflow within room. Tolerance for individual outlets within a single room having multiple outlets shall be as for “Air Outlets and Inlets.”

B. Set plumbing systems water flow rates within plus or minus 10 percent.

3.13 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Interim Reports: Prepare periodic lists of conditions requiring correction and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.14 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
   1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing field supervisor. Report shall be co-signed by the Contractor, attesting that he has reviewed the report, and the report has been found to be complete and accurate.
   2. The certification sheet shall be followed by sheet(s) listing items for which balancing objectives could not be achieved. Provide explanation for failure to achieve balancing objectives for each item listed.
   3. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:
   1. Pump curves.
   2. Fan curves.
   3. Manufacturers' test data.
   4. Field test reports prepared by system and equipment installers.
   5. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:
   1. Title page.
   2. Name and address of the TAB specialist.
   3. Project name.
   4. Project location.
   5. Project Performance Guaranty
   6. Architect's name and address.
   7. Engineer's name and address.
   8. Contractor's name and address.
   9. Report date.
   10. Signature of TAB supervisor who certifies the report.

11. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
12. Summary of contents including the following:
    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.
13. Nomenclature sheets for each item of equipment.
14. Data for terminal units, including manufacturer's name, type, size, and fittings.
15. Test conditions for fans and pump performance forms including the following:
    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Duct, outlet, and inlet sizes.
3. Pipe and valve sizes and locations.
4. Terminal units.
5. Balancing stations.
6. Position of balancing devices.

E. Air distribution outlets and inlets shall be shown on keyed plans with designation for each outlet and inlet matching designation used in Contract Documents and TAB test reports. Room numbers shall be included in keyed plans and test reports. Where multiple outlets and inlets are installed within a single room, a designation shall be assigned and listed for each outlet and inlet in addition to room number.

F. Test Reports – General:
1. All test reports containing air or liquid flow data shall record flow values prior to system adjustment in addition to required data listed for each test report.

G. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.

e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches, and bore.
i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:
   a. Motor make, and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches, and bore.
   f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
   a. Total air flow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
   d. Discharge static pressure in inches wg.
   e. Filter static-pressure differential in inches wg.
   f. Preheat-coil static-pressure differential in inches wg.
   g. Cooling-coil static-pressure differential in inches wg.
   h. Heating-coil static-pressure differential in inches wg.
   i. Outdoor airflow in cfm.
   j. Return airflow in cfm.
   k. Relief airflow in cfm.
   l. Outdoor-air damper position, normal and economizer, power exhaust, or power exhaust economizer modes, as applicable to installed equipment.
   m. Return-air damper position.
   n. Relief-air damper position, normal and economizer, power exhaust, or power exhaust economizer modes, as applicable to installed equipment.

H. Apparatus-Coil Test Reports:
1. Coil Data:
   a. System identification.
   b. Location.
   c. Coil type.
   d. Number of rows.
   e. Fin spacing in fins per inch o.c.
   f. Make and model number.
   g. Face area in sq. ft.
   h. Tube size in NPS.
   i. Tube and fin materials.

j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):
   a. Air flow rate in cfm.
   b. Average face velocity in fpm.
   c. Air pressure drop in inches wg.
   d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
   e. Return-air, wet- and dry-bulb temperatures in deg F.
   f. Entering-air, wet- and dry-bulb temperatures in deg F.
   g. Leaving-air, wet- and dry-bulb temperatures in deg F.
   h. Refrigerant expansion valve and refrigerant types.
   i. Inlet steam pressure in psig.

I. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
   1. Unit Data:
      a. System identification.
      b. Location.
      c. Make and type.
      d. Model number and unit size.
      e. Manufacturer's serial number.
      f. Fuel type in input data.
      g. Output capacity in Btu/h.
      h. Ignition type.
      i. Burner-control types.
      j. Motor horsepower and rpm.
      k. Motor volts, phase, and hertz.
      l. Motor full-load amperage and service factor.
      m. Sheave make, size in inches, and bore.
      n. Center-to-center dimensions of sheave, and amount of adjustments in inches.
   2. Test Data (Indicated and Actual Values):
      a. Total air flow rate in cfm.
      b. Entering-air temperature in deg F.
      c. Leaving-air temperature in deg F.
      d. Air temperature differential in deg F.
      e. Entering-air static pressure in inches wg.
      f. Leaving-air static pressure in inches wg.
      g. Air static-pressure differential in inches wg.
      h. Low-fire fuel input in Btu/h.
      i. High-fire fuel input in Btu/h.
      j. Manifold pressure in psig.
      k. High-temperature-limit setting in deg F.
      l. Operating set point in Btu/h.
      m. Motor voltage at each connection.
      n. Motor amperage for each phase.

o. Heating value of fuel in Btu/h.

J. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
1. Unit Data:
a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Air flow rate in cfm.
i. Face area in sq. ft.
j. Minimum face velocity in fpm.
2. Test Data (Indicated and Actual Values):
a. Heat output in Btu/h.
b. Air flow rate in cfm.
c. Air velocity in fpm.
d. Entering-air temperature in deg F.
e. Leaving-air temperature in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

K. Fan Test Reports: For supply, return, and exhaust fans, include the following:
1. Fan Data:
a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
2. Motor Data:
a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

L. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft.
g. Indicated air flow rate in cfm.
h. Indicated velocity in fpm.
i. Actual air flow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

M. Air-Terminal-Device Reports:
1. Unit Data:
a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft.
2. Test Data (Indicated and Actual Values):
a. Air flow rate in cfm.
b. Air velocity in fpm.
c. Preliminary air flow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final air flow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

N. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:
1. Unit Data:
a. Unit identification.

b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):
   a. Static head in feet of head or psig.
   b. Pump shutoff pressure in feet of head or psig.
   c. Actual impeller size in inches.
   d. Full-open flow rate in gpm.
   e. Full-open pressure in feet of head or psig.
   f. Final discharge pressure in feet of head or psig.
   g. Final suction pressure in feet of head or psig.
   h. Final total pressure in feet of head or psig.
   i. Final water flow rate in gpm.
   j. Voltage at each connection.
   k. Amperage for each phase.

O. Instrument Calibration Reports:
   1. Report Data:
      a. Instrument type and make.
      b. Serial number.
      c. Application.
      d. Dates of use.
      e. Dates of calibration.

3.15 INSPECTIONS

A. Initial Inspection:
   1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
   2. Check the following for each system:
      a. Measure airflow of at least 10% percent of air outlets.
      b. Measure water flow of at least 10% percent of terminals.

c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
d. Verify that balancing devices are marked with final balance position.
e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:
1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.
2. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Architect.
3. Architect shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than 10 percent, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contact the TAB specialists' governing organization for remedial action by the governing organization under the workmanship and performance warranty. See article, Warranty.
3. If remedial action is not provided by the TAB specialists' governing organization in a timely manner, Owner may contract the services of another TAB specialist to complete the TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB specialists' final payment.

D. Prepare test and inspection reports.

3.16 ADDITIONAL TESTS

A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 23 08 00 - TITLE 24 COMMISSIONING OF HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for commissioning of HVAC systems for Title 24 (T-24) compliance.

B. Scope: Commissioning Coordinator shall complete the building systems commissioning requirements of the California Energy Code, as applicable to Project. It is not the intention of Project specifications to require duplication in testing.
   1. T-24 commissioning activities may be coordinated with Contractor tests and TAB work specified in technical Sections.
   2. T-24 commissioning activities may be coordinated with LEED and CHPS program commissioning activities, as applicable to Project.

1.02 RELATED REQUIREMENTS

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

B. The requirements of this Section apply to all Sections of Division 23.

C. In the event of conflict between requirements of Division 01 Title 24 commissioning specifications and this Section, Division 01 requirements shall prevail.

1.03 REFERENCES

A. 2022 California Energy Code.

B. 2022 California Energy Code and Building Energy Efficiency Standards Reference Appendices.

C. 2022 Building Energy Efficiency Standards Nonresidential Compliance Manual.

1.04 DEFINITIONS

A. Commissioning Coordinator: General Contractor, or an entity engaged by the General Contractor to perform T-24 commissioning.

B. Covered Processes: Process equipment for which there are listed requirements in the California Energy Code.

C. OPR: Owner's Project Requirements.

D. TAB: Testing, Adjusting, and Balancing.

1.05 SUBMITTALS (FOR RECORD ONLY)

A. Submit the following:
1. Commissioning Plan.
2. Systems Manual.
3. Commissioning Report.
4. Certificates of Installation.
5. Certificates of Acceptance.

B. Above items for inclusion in closeout documents submitted to authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 TEST INSTRUMENTS

A. Commissioning Coordinator shall supply test instruments. Instruments to be used for testing and balancing shall have been calibrated within a period of one year, or less if recommended by instrument manufacturer, and be checked for accuracy prior to start of work.

PART 3 - EXECUTION

3.01 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

A. Architect/Engineer:
1. Performs construction observation. Provides construction observation reports.
2. Reviews and approves Commissioning Plan, Systems Manual, and Commissioning Report.
3. Assists in problem resolution.

B. Commissioning Coordinator:
1. Coordinates commissioning process.
2. Develops Commissioning Plan.
3. Schedules and conducts functional testing. Completes Certificates of Acceptance.
4. Assembles Systems Manual.
5. Schedules and conducts systems operations training. Verifies systems operations training completion.

C. HVAC Subcontractor: Assists in functional testing.

D. Electrical Subcontractor: Assists in functional testing.

E. Controls Subcontractor: Assists in functional testing.

F. TAB Subcontractor: Assists in functional testing.

G. Equipment Manufacturers/Vendors:
   1. Performs Check, Test, and Start of equipment and systems, as required by Project technical Sections.
   2. Provides systems and equipment documentation required to complete functional testing and assemble Systems Manual.

3.02 COMMISSIONING PLAN

A. Commissioning Coordinator shall author the code-required Commissioning Plan. The Commissioning Plan shall address HVAC systems for which commissioning is required. The Commissioning Plan shall be updated by Commissioning Coordinator throughout the construction process. The Commissioning Plan shall contain the following:
   1. General Project Information: Commissioning Coordinator shall obtain general Project information from Project architectural Drawings.
   2. Commissioning Goals:
      a. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
      b. Verify and document proper integrated performance of equipment and systems utilizing functional testing for mechanical system acceptance, as required by the California Energy Code.
      c. Verify that Systems Manual documentation is complete.
      d. Verify that operating personnel are trained to enable them to operate, monitor, adjust, and maintain HVAC systems in an effective and energy-efficient manner.
   3. Commissioning Coordinator shall compile the following information and include in Commissioning Plan:
      a. An explanation of original design intent: Commissioning Coordinator shall obtain copies of the OPR and BOD for the Project.
      b. Equipment and systems to be tested, including the extent of tests: Test 100 percent of a given type of installed equipment having associated Acceptance Requirements.
         1) Refer to forms MCH-01-E on Drawings for systems to be commissioned.
         2) Covered Processes: In addition to systems listed in MCH-01-E on Drawings, complete Acceptance Requirements for the following systems, if applicable to Project:

a) Parking garage ventilation systems.
b) Compressed air systems.
c) Type 1 Kitchen exhaust systems.

c. Functions to be tested: Refer to 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.
d. Conditions under which the test shall be performed.
e. Measureable criteria for acceptable performance: Refer to 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.
f. Commissioning team information:
1) Refer to Project information on architectural Drawings for design team participants. Commissioning Coordinator shall add subcontractor information to provided design team information and include in Commissioning Plan.
g. Commissioning process activities, schedules, and responsibilities. Plans for the completion of functional performance testing, systems operations training, and commissioning report.

3.03 CERTIFICATES OF INSTALLATION

A. Commissioning Coordinator shall complete applicable Certificates of Installation forms.

3.04 FUNCTIONAL TESTING REQUIREMENTS

A. Contractor shall complete the applicable Acceptance Requirements for Code Compliance contained in the California Building Energy Efficiency Standards. Refer to T-24 compliance forms on Drawings for systems having Acceptance testing requirements. Contractor shall perform Acceptance tests and complete the appropriate “Certificates of Acceptance.” Contractor shall engage certified HERS Rater to verify duct leakage rate for duct systems indicated on T-24 compliance forms on Drawings as requiring duct leakage rate testing. For additional duct leak testing requirements, refer to Section 23 80 00, “Heating, Ventilating, and Air Conditioning,” Article, “Ductwork Sealing and Leak Testing.”
1. Covered Processes: In addition to systems listed on T-24 compliance forms on Drawings, complete Acceptance Requirements for the following systems, if applicable to Project:
a. Parking garage ventilation systems.
b. Compressed air systems.
c. Type 1 Kitchen exhaust systems.

3.05 SYSTEMS MANUAL

A. Commissioning Coordinator shall assemble Systems Manual in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and

Division 01 specifications, including Section 01 79 00, Demonstration and Training, and commissioning specifications.

3.06 SYSTEMS OPERATIONS TRAINING

A. Commissioning Coordinator shall provide systems operations training in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and Division 01 specifications, including Section 01 79 00, Demonstration and Training, and commissioning specifications.

3.07 COMMISSIONING REPORT

A. Commissioning Coordinator shall complete Commissioning Report in accordance with the requirements of the California Energy Code and Division 01 commissioning specifications.

END OF SECTION

SECTION 23 80 00 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Fans.
2. Air inlets and outlets.
3. Filters.
4. Dampers.
5. Ductwork.
6. Insulation.
7. Thermal hanger shield inserts.

1.02 RELATED REQUIREMENTS

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

B. Section 23 00 50, Basic HVAC Materials and Methods.

C. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

D. Section 23 09 23, Direct Digital Control (DDC) System for HVAC.

1.03 ACTION SUBMITTALS

A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.

B. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, weight, corner or mounting point weights, furnished specialties and accessories; and installation and start-up instructions. Product data shall include applicable product listings and standards. Refer to Section 23 00 50, Basic HVAC Material and Methods for additional requirements.
1. Upon approval of submittal, provide manufacturer’s installation and operating instructions to the Project inspector for the following:
a. Fire dampers, smoke dampers, and combination smoke-fire dampers.

C. Engineering Data: Submit fan curves and sound power level data for each fan unit. Data shall be at the scheduled capacity. Data shall include the name of the rating agency or independent laboratory.

1.04 INFORMATIONAL SUBMITTALS

A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.

B. Record of pre-installation meeting.

C. Coordinated Layouts: Submit coordinated layouts. For requirements refer to article, Coordinated Layouts, in this Section.

1.05 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.

B. Maintenance Data: Submit maintenance data and parts list for each piece of equipment, control, and accessory; including "trouble-shooting guide," in Operation and Maintenance Manual.

C. Record Drawings: Submit Record Drawings of installed ductwork, duct accessories, and outlets and inlets in accordance with requirements of Division 01.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Belts: One set(s) for each belt-driven unit.
   2. Provide one complete set(s) of filters for each filter bank.

1.07 COORDINATED LAYOUT

A. Coordinated layouts are required to amplify, expand and coordinate the information contained in the Contract Documents.

B. Provide minimum 1/4 inch equals one foot scaled coordinated layout drawings showing plan and pertinent section or elevation views of piping, ductwork, equipment, accessories, and electrical systems. Drawings shall be reproducible and work of each trade represented shall be fully coordinated with structure, other disciplines, and finished surfaces. Drawings shall be presented on a single size sheet. Coordinated layout drawings shall have title block, key plan, north arrow and sufficient grid lines to provide cross-reference to design Drawings.
   1. Provide a stamp or title block on each drawing with locations for signatures from all contractors involved, including but not limited to the General, HVAC, Plumbing, Fire Protection, and Electrical contractors. Include statement for signature that the contractor has reviewed the coordinated layout drawings in detail and has coordinated the work of his trade.

2. Show on drawings the intended elevation of all ductwork in accordance with the following example:

   B.O.D. = 9'-0"
   OFFSET UP 6"
   B.O.D. = 9'-6"

3. Highlight, encircle or otherwise indicate deviations from the Contract Documents on the coordinated layouts. Architect will not be responsible for identifying deviations from the original Contract Documents.

C. Since scale of contract drawings is small and all offsets and fittings are not shown, Contractor shall make allowances in bid for additional coordination time, detailing, fittings, offsets, hangers and the like to achieve a fully coordinated installation. If changes in duct size are required, equivalent area shall be maintained and the aspect ratio shall not be in excess of 2 to 1 unless approved by the engineer. Drawings shall be submitted for review prior to fabrication and installation. Drawings may be submitted in packages representing at least one quarter of the building ductwork.

D. Check routing on all ductwork before fabricating. Report any discrepancies to Architect. No extra cost will be allowed for failure to conform to above.

1.08 QUALITY ASSURANCE

A. Design Criteria:
   1. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture. All gas-fired equipment shall be UL, ETL or CSA listed.
   2. Supply all equipment and accessories in accordance with requirements of applicable national, state and local codes.
   3. All items of a given type shall be products of the same manufacturer.
   4. Scheduled equipment performance is minimum capacity required.
   5. Scheduled electrical capacity shall be considered as maximum available.
   6. Scheduled gas BTU input shall be considered as maximum available.

1.09 FIELD CONDITIONS

A. Interruption of Existing Services: Do not interrupt services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services according to requirements indicated:
   1. Notify Architect no fewer than two days in advance of proposed interruption of services.
   2. Do not interrupt services without Architect's written permission.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.02 FANS

A. All fans shall be Air Moving and Control Association Inc. (AMCA) labeled.

B. Provide self-aligning, enclosed ball bearings, accessible for lubrication unless specified otherwise.

C. Provide variable speed switch for all direct drive fans.

D. Ceiling Mounted Fans:
1. Acoustic lined cabinet, built-in back draft damper, vibration isolated fan and motor, variable speed switch.
2. Provide sloped roof or flat roof type roof cap, or wall cap to suit the location indicated on the Drawings.

E. Fan Drives:
1. Drive Design: The design horsepower rating of each drive shall be at least 1.5 times, single belt drives 2 times, the nameplate rating of the motor with proper allowances for sheave diameters, speed ratio, arcs of contact and belt length.
2. Provide variable speed drives, Dayco, Browning, Woods, or equal. Allow for replacement of fan and motor drives and belts as required to suit the balance requirements of the project.
3. Select variable speed drives to allow an increase or decrease of minimum of ten percent of design fan speed.

F. Motors:
1. Motors of 25 HP and less shall have adjustable pitch sheaves; sheaves on motors above 25 HP may be non-adjustable. Change, at no extra cost to Owner, the non-adjustable sheaves to obtain desired air quantities.
2. For single-phase fan motors sized larger than 1/12 hp and smaller than 1 hp, refer to Article, Electric Motors, in Section 23 00 50, Basic HVAC Materials and Methods.

G. Sheaves: Sheaves shall be cast or fabricated, bored to size or bushed with fully split tapered bushings to fit properly on the shafts. All sheaves shall be secured with keys and set screws.

H. Belts:

1. All belts shall be furnished in matched sets.
2. Belts shall be within 1 degree 30 minutes of true alignment in all cases.

I. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Greenheck Fan Corporation.
2. Loren Cook Company.
3. PennBarry.
4. American Coolair Corporation.

J. Owner Training: Manufacturer shall provide one on-site 1-hour training session for Owners' maintenance personnel.

2.03 AIR INLETS AND OUTLETS

A. Except as otherwise indicated, provide manufacturer's standard inlets and outlets where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Ceiling, wall or floor Compatibility: Provide inlets and outlets with border styles that are compatible with adjacent ceiling, wall or floor systems, and that are specifically manufactured to fit into ceiling, wall or floor module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems that will contain each type of air outlet and inlet.

C. Refer to Schedule on Mechanical Drawings for details of inlets and outlets to be used.

2.04 AIR FILTERS

A. Provide MERV 13 disposable pleated media type. Refer to specific equipment Articles for filter depth and for exceptions to this specification. Filters shall conform to the following:
1. Standards:
   a. ASHRAE Standard 52.2-2007.
   b. Underwriters Laboratories: U.L. 900, Class 2.
2. Construction:
   a. Media: Synthetic or cotton-synthetic blend with radial pleats.
   b. Media Frame: High wet-strength beverage board.
   c. Media Support: Welded wire or expanded metal grid bonded to air leaving side of the media.
3. Performance: 2" deep filter shall have a maximum initial air resistance of 0.31 inches w.g.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Camfil Farr, Inc., model 30/30.

2. Flanders Corporation, model 40 LPD.

C. Temporary (Construction Period) Filters:
1. Install new temporary filters in all units that have filter systems installed. Temporary filters shall match the permanent filters that are specified for the units. Replace filters as needed, in accordance with manufacturer's directions, in order to provide protection for the unit prior to occupancy by the Owner.
2. If air handling units are operated during construction of the project, install temporary filters directly over each return air inlet. Filters shall match the permanent filters that are specified for the units. Select size of filter to completely cover the frame of the return air inlet, and tape filters firmly in place to eliminate any construction debris from entering the duct system or unit. Remove the temporary filters upon completion of the work, and repair all damaged paintwork.

D. Spare Filters:
1. Furnish two new, complete sets of filter cartridges for each filter bank on completion and acceptance of the work. Install one set of filters in units (prior to final air balance). Provide units designed to accommodate washable, permanent filters with one washable, permanent filter.

2.05 DAMPERS

A. Backdraft Dampers: Ruskin CBD2, counterbalanced, Nailer Industries, or equal.

B. Manual Air and Balance Dampers: Provide dampers of single blade type or multi-blade type constructed in accordance with SMACNA, "HVAC Duct Construction Standards," except as noted herein.
1. Rectangular Ductwork:
a. Single damper blades may be used in ducts up to 10 inches in height. Dampers shall be 16 gauge minimum. Provide self-locking regulators, equal to Ventlok 641. Provide end bearings equal to Ventlok 607 at each damper. Provide continuous solid 3/8 inch square shafts.
b. Multiple blade dampers shall be equal to Ruskin CD35 Standard Control Damper. Maximum width for multiple damper blades for use in rectangular duct shall not exceed 6 inches.
c. Where duct velocity may be expected to exceed 1500 fpm, provide Ruskin CD-50, or equal, low leakage dampers with airfoil blades.
2. Round Ductwork:
a. Single damper blades may be used in ducts up to 12 inches in diameter. Provide multiple blade opposed blade dampers, with connected linkage, for ductwork larger than 12 inches in diameter.
b. Damper blades for round ductwork shall be 20 gauge steel for ducts up to 12 inches diameter and 16 gauge steel for dampers larger than 12 inches damper. Provide self-locking regulators, equal to Ventlok 641, Durodyne, or

equal for operation of dampers. Provide end bearings equal to Ventlok 607 and provide continuous solid 3/8 inch square shafts.

3. Where ductwork is externally insulated, provide self-locking regulators equal to Ventlok 644, Durodyne, or equal for rectangular ductwork, and Ventlok 637, Durodyne, or equal for round ducts.

C. Fire Dampers and Combination Fire/Smoke Dampers:

1. Fire dampers and combination fire/smoke dampers shall be listed and approved by the California State Fire Marshal. Installation shall conform to the manufacturer's UL approved installation instructions.
   a. Fire dampers shall be UL 555 classified and labeled as dynamic fire dampers approved for wall and floor installation. They shall ship from the manufacturer as an assembly with a minimum 20-gauge factory installed sleeve. Sleeve length shall suit the requirements of the wall construction. Each dynamic fire damper/sleeve assembly shall ship complete with factory "roll formed" one-piece angles with pre-punched holes for easy installation. Dynamic fire dampers for vertical installation must consist of a single section on sizes up to 33" x 36" and a single section on sizes up to 24" x 24" for horizontal installation. 1-1/2 hour dynamic fire dampers shall be Ruskin DIBD20, Pottorff, or equal. 3 hour dynamic fire dampers shall be Ruskin DIBD230, Pottorff, or equal.
   b. Fire dampers for high pressure/velocity systems where velocities exceed 2000 fpm and/or 4" w.g. pressure fire damper shall be Ruskin FD60, Pottorff, or equal.
   c. Fire dampers for ceiling installation shall be UL 555C classified and labeled as ceiling dampers. They shall be provided with a thermal insulating blanket to fit the inlet or outlet condition if required by the application. Ceiling dampers shall be Ruskin CFD 2, 3, 4 or 5. Ceiling dampers for ceilings constructed of wood shall have UL tested in design L501 and shall be Ruskin CFD7, Pottorff, or equal.
   d.
   e. Round (larger than 24" diameter) or rectangular combination fire smoke dampers shall include roll-formed structural hat channel frame, reinforced at the corners, formed from a single piece of minimum 16 gauge equivalent thickness formed from single piece galvanized steel. Bearings shall be stainless steel turning in an extruded hole in the frame. Blade edge seals shall be silicone rubber designed to withstand 450° F and galvanized steel mechanically locked in to the blade edge (adhesive type seals are not acceptable). Each damper shall be equipped with a factory-installed sleeve of 17" minimum length and factory "roll formed" one-piece angles with pre-punched holes for easy installation. Dampers shall be Ruskin FSD60, Pottorff, or equal.
   f. All FSD60 type dampers shall be AMCA licensed and shall bear the AMCA Seal for Air Performance. AMCA certified testing shall verify pressure drop

does not exceed .03” w.g. at a face velocity of 1,000 fpm on a 24” x 24” damper.

g. Fusible links shall have temperature rating approximately 50° F above normal maximum operating temperature of the heat producing appliance.
   1) If project requires re-openable fire/smoke dampers, provide Ruskin 165 ° F / 350° F TS150, NCA or equal. The TS150 firestat replaces the EFL and allows the damper to be re-opened from remote location up to 350 ° F. TS150 shall include full open and full closed damper position contacts for interface with remote position indication panel.
   2) Each fire/smoke damper shall be equipped with “controlled closure” quick detect heat actuated release device to prevent duct and HVAC component damage. Release device shall allow easy reset after moderate temperature rise outside the sleeve. Heat release device shall be the Ruskin EFL, NCA or equal.
   3) Unless the system is using a validation control system, each fire/smoke damper shall be equipped with a control panel including blade position indicator lights and a key operated switch. The panel cover shall be oversized for flush mount into the wall or ceiling and shall have a brushed look. Control panel shall be Ruskin MCP2, Pottorff, or equal.

2. All actuators used for smoke dampers or combination fire/smoke dampers shall have a cycle time requirement of not more than every twelve months and shall be rated for continuous "0n" duty and shall be provided with internal spring return. Actuators shall be equipped with pilot light, remote key test switch, end switch and circuitry to activate pilot light on remote key (test) switch located in corridor ceiling adjacent to damper. Electric motors shall be Invensys MA-250, MA-253, Honeywell H2000, or equal.

D. Where required to suit the size of damper required, provide manufacturers standard UL Classified mullions, arranged to support multiple dampers. Assembly shall be of minimum 16 gauge galvanized steel, complete with all accessory caps and framing members required for installation.

2.06 DUCTWORK

A. Construct and install sheet metal ductwork in accordance with the California Mechanical Code for 2 inches static pressure for supply air, and 2 inches minimum for return and exhaust air unless otherwise noted on Drawings.
   1. Where not in conflict with the California Mechanical Code, construct and install all sheet metal ductwork in accordance with SMACNA HVAC Duct Construction Standards (Metal and Flexible). Where applicable for HVAC work, construct and install sheet metal work in accordance with SMACNA Architectural Sheet Metal Manual.

2. Provide variations in duct size, and additional duct fittings as required to clear obstructions and maintain clearances as approved by the Architect at no extra cost to the Owner.
3. Gauges, joints and bracing shall be in accordance with the California Mechanical Code.
4. Provide beading or cross breaking for all ductwork inside building. Provide cross breaking for ductwork exposed to weather.
5. At the contractor's option, ductwork may be fabricated using the Ductmate, Nexus, Quickduct, Transverse Duct Connection (TDC), Pyramid-Loc duct connection systems, or equal. Fabricate in strict conformance with manufacturer's written installation instructions and in accordance with California Mechanical Code.
    a. Seal flanged ends with pressure sensitive high density, closed cell neoprene or polyethylene tape gasket, Thermo 440, or equal.
    b. Provide metal clips for duct connections, except at breakaway connections for fire dampers and fire smoke dampers. Provide corner clips at each corner of duct, through bolted, at all locations except at breakaway connections for fire dampers and fire smoke dampers. Where used on locations exposed to weather, provide continuous metal clip at top and sides of duct, with 1 inch overhang for top side.

B. Design and installation standards:
1. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) for all work in this section.
2. NFPA Compliance: Comply with ANSI/NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."
3. California Mechanical Code.

C. Duct sizes indicated are external sizes.

D. Galvanized Sheet Steel: Lock-forming quality, ASTM A924 and ASTM A653, Coating Designation G 90. Provide mill phosphatized finish for exposed surfaces of ducts exposed to view.
1. Provide mill certification for galvanized material at request of the Project Inspector.

E. Duct Sealants:
1. Sealant shall have a VOC content of 250 g/L or less.
2. Sealant shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
3. Provide one part, non-sag, synthetic latex sealant, formulated with a minimum of 68 percent solids. Sealant shall comply with ASTM E84, Surface Burning Characteristics.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   1) Design Polymerics, model DP1010.
   2) Polymer Adhesive Sealant Systems Inc, model Airseal #11.
   3) McGill Airseal, LLC.

F. Duct Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, straps, trim, and angles for support of ductwork.

G. Rectangular Duct Fabrication:
1. Shop fabricate ductwork of gauges and reinforcement complying with the more stringent of the following standards, except as noted herein.
   a. SMACNA HVAC Duct Construction Standards
   b. California Mechanical Code
2. Fabricate ducts for 2 inch pressure class with minimum duct gauges and reinforcement as follows, except as otherwise noted:

Table A

Duct Dimension	Minimum Gauge	Joint Reinforcement Per CMC
Through 12"	26	Not Required
13" through 18"	24	Not Required
19" through 30"	24	C/4
31" through 42"	22	E/4
43" through 54"	22	F/2
55" through 60"	20	G/4
61" through 84"	20	I/2
85" through 96"	20	J/2
Over 96"	18	K/2

3. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times associated duct width. Fabricate

to include single thickness turning vane in elbows where space does not permit the above radius or where square elbows are shown. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers. Turning vanes shall be E-Z Rail II, Durodyne, or equal.

4. Fabricate round supply connections at rectangular, plenum type fittings using spin-in type fittings, complete with extractor and volume control damper. Refer to Paragraph “DAMPERS” for damper requirements.
5. Provide drive slip or equivalent flat seams for ducts exposed in the conditioned space or where necessary due to space limitations. On ducts with flat seams, provide standard reinforcing on inside of duct. Duct connection to outlet on exposed duct shall be full size of outer perimeter of outlet flange.
6. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
7. Provide 20 gauge minimum for ductwork exposed within occupied spaces.

H. Rectangular Internally Insulated Duct Fabrication:
   1. Provide internal duct lining where indicated on the Drawings, with a minimum of 10'-0" length in each direction from the fan, fan casing, or unit casing. Line all transfer ducts.
      a. Where ductwork is exposed to weather or outside the building insulation envelope, provide 2 inch thick, 1-1/2 pound density internal lining with matte facing, with an R-Value of 8.0 minimum.
      b. Where ductwork is within the building insulation envelope, lining shall be 1” thick, 1-1/2 pound density, with R-value of 4.2 minimum.
      c. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
      d. Where installed exposed in the conditioned space, duct shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value – R-4.2).
      e. Cement duct liner in place with nonflammable, non-hardening duct adhesive. Seal all raw edges of insulation inside ductwork with adhesive, including longitudinal liner edges.
      f. Provide metal nosing at all locations where liner is preceded by unlined metal.
      g. Provide sheet metal weld pins and washers or clinch pins and washers on all ductwork on 12 inch intervals with the first row within 3 inches of the leading edge of each piece of insulation and within 4 inches of corners. No use of adhesive mounted pins will be considered.
         1) Install clinched pin fasteners with properly adjusted automatic fastening equipment. Manual installation will not be considered.
         2) Install weld pins with properly adjusted automatic fastening equipment. Installation shall not damage the galvanized coating on the outside of the duct.

h. All ductwork, adhesives, lining, sealant, flex duct and the like shall have a flame spread of 25 or less and developed smoke rating of 50 or less when tested in accordance with one of the following test methods: NFPA 255, ASTM E84, or UL 723.

i. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

Manufacturer:	Product:
Johns Manville	Linacoustic RC
CertainTeed Corporation	ToughGard
Fosters Adhesive	85-62
Swifts Adhesive	7336

I. Round and Oval Ductwork Fabrication:

1. Round and oval duct and fittings shall be spiral lockseam or longitudinal seam as indicated in table below. Provide couplings to join each length of duct.
   a. At contractors' option, round or oval ductwork may be utilized in place of rectangular ductwork shown on Drawings, provided available space allows installation of round or oval ductwork without compromising space required for installation of products and systems of other trades.
      1) Round or oval ductwork utilized in place of rectangular ductwork shown on Drawings shall be sized to have a static pressure loss equivalent to rectangular duct shown on Drawings.
      2) Unlined round or oval duct shall not be utilized in place of rectangular internally lined ductwork shown on Drawings.
2. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times associated duct width. Provide two-piece, die-stamped, 45-degree to 90-degree elbows for sizes up to 12 inches; five-piece, 90-degree elbows for sizes 12 inches and above; conical tees; and conical laterals. All reducers shall be placed after a tap has been made on the duct main. Reducers shall be long-taper style.
3. Round Ductwork: Construct of galvanized sheet steel complying with ANSI/ASTM A 653 by the following methods and in minimum gauges listed.

Diameter	Minimum Gauge	Method of Manufacture

Up to 14"	26	Spiral Lockseam
15" to 23"	24	Spiral Lockseam
24" to 36"	22	Spiral Lockseam
37" to 50"	20	Spiral Lockseam
51" to 60"	18	Spiral Lockseam
Over 60"	14	Longitudinal Seam

4. Provide locked seams for spiral duct; fusion welded butt seam for longitudinal seam duct.
5. Fittings and Couplings: Construct of minimum gauges listed. Provide continuous welds along seams at exposed ducts. Provide spot weld bonded seams at concealed ducts.

Diameter	Minimum Gauge
3" to 36"	20
38" to 50"	18
Over 50"	16

6. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
7. Provide 20 gauge minimum for ductwork exposed within occupied spaces.

J. Round Internally Insulated Duct and Fittings: Where ductwork is exposed to weather or outside the building insulation envelope, construct with outer pressure shell, 2 inch thick (Minimum R-value = R-8) insulation layer, and perforated inner liner. Where ductwork is within the building insulation envelope, construct with outer pressure shell, 1 inch thick (minimum R-value = R4.2) insulation layer, and perforated inner liner. Construct shell and liner of galvanized sheet steel complying with ANSI/ASTM A 653, of spiral lockseam construction (use longitudinal seam for over 59 inches), in minimum gauges listed in table below. Where installed exposed in the conditioned space: duct and fitting outer pressure shell shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value = R-4.2), and perforated inner liner.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" TO 12"	26 gauge	24 gauge
13" TO 24"	24 gauge	24 gauge
25" to 34"	22 gauge	24 gauge
35" to 48"	20 gauge	24 gauge
49" to 58"	18 gauge	24 gauge
Over 59"	16 gauge	20 gauge

1. Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams of outer shell at exposed ducts. Provide spot weld bonded seams at concealed ducts.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 34"	20 gauge	24 gauge
36" to 48"	18 gauge	24 gauge
Over 48"	16 gauge	24 gauge

2. Inner Liner: Perforate with 3/32 inch holes for 22 percent open area. Provide metal spacers welded in position to maintain spacing and concentricity.
3. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
4. Where installed exposed in the conditioned space, duct shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value – R-4.2).
5. All ductwork, adhesives, lining, sealant, flex duct and the like shall have a flame spread of 25 or less and developed smoke rating of 50 or less when tested in accordance with one of the following test methods: NFPA 255, ASTM E84, or UL 723.
6. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. Sheet Metal Div., McGill AirFlow, LLC., Acousti-k27
   b. Semco Duct and Acoustical Products, Inc.

c. Air Systems Manufacturing, Inc. - Las Vegas

K. Duct Access Doors:
1. Duct Access: Provide hinged access door in rectangular ducts for access to fire dampers, control equipment, etc. Access door size shall be duct diameter wide by duct diameter high for all ducts under 24 inches. Ducts over 24 inches in diameter shall have 24-inch by 18-inch access doors. Minimum size access doors shall be 6 inches by 6 inches.
2. Provide hinged style access doors for round ductwork, NCA Manufacturing, Inc., Model AD-RD-87, Pottorff Series 60, or equal. Access doors shall be 16 gauge galvanized steel with continuous piano hinge. Locks shall be plated steel strike and catch. Provide 1" x 3/8" Polyethylene "Perma Stik" gasket all around door.

L. Flexible Air Ducts:
1. Provide exterior reinforced laminated vapor barrier, fiberglass insulation, encapsulated spring steel wire Helix, and impervious, smooth, non-perforated interior vinyl liner. Individual lengths of flexible ducts shall contain factory fabricated steel connection collars.
   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
      1) C.A. Schroeder, Inc., Cal Flex model 2PMJ.
      2) ThermaFlex model M KC.
2. Factory made air ducts shall be approved for the use intended and shall conform to the requirements of UL 181 and NFPA 90A. Each portion of a factory-made air duct system shall be identified by the manufacturer with a label or other suitable identification indicating compliance with UL 181, Class 1. Ducts shall be UL listed Class 1, maximum 25/50 smoke and flame spread and shall be installed in accordance with the terms of their listing and the requirements of SMACNA HVAC Duct Construction Standards (Metal and Flexible). Factory-made air ducts shall have the following minimum R-values: R-6.0 for ductwork installed within the building insulation envelope, R-8.0 for ductwork installed outside the building insulation envelope.
3. Flexible ductwork shall be maximum of 5 feet long, and shall be extended to the fullest possible length, in order to minimize pressure drop in the duct.
4. Flexible ducts shall be selected for minimum of 6 inch positive static pressure and minimum of 1 inch negative static pressure.
5. Duct Access Panels:
   a. Provide duct access panel assembly of the same material and gauge used for the duct. Duct access panels shall conform to the following:
      1) Fasteners: Black steel or stainless steel to match material used for the duct. Panel fasteners shall not penetrate duct wall.
      2) Gasket: Comply with NFPA 96, grease-tight, high temperature ceramic fiber, rated for minimum 1500 °F.

M. Flexible Connectors:
1. Materials: Flame-retardant or noncombustible fabrics. Coatings and adhesives shall comply with UL 181, Class 1, with flame spread index of 25 or less, and smoke-developed index of 50 or less.
2. Metal-Edged Connectors: Factory fabricated with a fabric strip 3 inches wide attached to two strips of 3-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
3. Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
   a. Minimum Weight: 26 oz./sq. yd.
   b. Tensile Strength: Minimum 475 lbf/inch in the warp and minimum 375 lbf/inch in the filling.
   c. Service Temperature: Minus 50 to plus 200 deg F.
4. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   a. Ductmate Industries, Inc., model Proflex.
   b. Ventfabrics, Inc., model Ventlon.

2.07 INSULATION MATERIALS

A. General:
1. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).
2. Products shall not contain asbestos, lead, mercury, or mercury compounds.
3. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
4. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
5. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
6. Test insulation, jackets and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723 or ASTM E84.
7. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.

B. Insulation Materials:
1. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Provide 2-inch wide stapling and taping flange.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   1) CertainTeed Corporation.
   2) Johns Manville.
   3) Knauf Insulation.
   4) Owens Corning.

C. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
      a. Design Polymerics.
      b. Foster Brand; H. B. Fuller Construction Products.
      c. Knauf Insulation.
   2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
   3. Service Temperature Range: 0 to plus 180 deg F.
   4. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
      a. Design Polymerics.
      b. Childers Brand; H. B. Fuller Construction Products.
      c. Foster Brand; H. B. Fuller Construction Products.
   2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
   3. Service Temperature Range: Minus 50 to plus 220 deg F.
   4. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
      a. Design Polymerics.
      b. Childers Brand; H. B. Fuller Construction Products.
      c. Foster Brand; H. B. Fuller Construction Products.
      d. Knauf Insulation.
   2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
   3. Service Temperature Range: 0 to plus 180 deg F.
   4. Color: White.

F. Field Applied Jackets:
1. PVC Jacket and Factory Fabricated Fitting Covers: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming.
a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1) Johns Manville, model Zeston, with Zeston 2000 fitting covers.
2) Proto Corporation, model LoSmoke.

2.08 THERMAL HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Buckaroos, Inc.
2. Carpenter & Paterson, Inc.
3. Clement Support Services.
4. Rilco Manufacturing Co., Inc.

B. Flame-spread index of 25 or less and smoke-developed index of 50 or less as tested by ASTM E 84.

C. Insulation-Insert Material for Cold or Hot Piping, from Minus 40 to Plus 275 Deg F: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength or ASTM C 1126, Type III rigid phenolic foam and vapor barrier.
1. Phenolic:
a. NPS 10 and Smaller: 3.75-lb/cu. Ft. minimum compressive strength.
b. NPS 12 to NPS 30: 5.0-lb/cu. ft. minimum compressive strength.

D. Insulation-Insert Material for Piping Above 275 Deg F: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig or ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength.

E. Insulation Protection Shields: Galvanized metal, G90 coating designation, complying with ASTM A 653/A 653M, 180-degree saddle.

F. Heavy Duty Insulation Protection Shields: Galvanized metal, 12-gage, G90 coating designation, complying with ASTM A 653/A 653M, 180-degree saddle. Structural steel plate welded to bottom of galvanized shield for sizes NPS 6 and larger.

G. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

H. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

I. Insert Length: Extend minimum 1-1/2 inches beyond sheet metal shield.

2.09 TEMPERATURE CONTROL SYSTEM

A. Refer to Section 23 09 23, Direct Digital Control System for HVAC.

PART 3 - EXECUTION

3.01 FAN INSTALLATION

A. Ceiling Mounted Fans: Mount variable speed switch within fan housing. Mark final balance point on variable speed switch.

B. Provide access doors for fans or motors mounted in ductwork.

C. Mount all fans as detailed on Drawings and in compliance with CBC standards.

D. Fan motors mounted in air-stream to be totally enclosed.

E. Completely line supply, return or exhaust fan cabinets with 1 inch thick, 3/4 pound density acoustic insulation securely cemented in place.

3.02 AIR INLETS AND OUTLETS INSTALLATION

A. Provide all air inlets and outlets with gaskets and install so that there will be no streaking of the walls or ceilings due to leakage. Duct connection to outlet on exposed duct shall be full size of outer perimeter of outlet flange.

B. Unless otherwise indicated on Drawings, provide rectangular galvanized steel plenum on top of each diffuser and ceiling return for connection to ductwork. Line plenum with internal insulation as indicated for lined ductwork. Size plenum to allow full opening into air terminal. Plenum sheet metal gauge shall be equal to gauge for rectangular equivalent of the branch duct serving the air inlet or outlet.

C. Ceiling-mounted air inlets, outlets, or other services installed in T-Bar type ceiling systems shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.
   1. Air inlets, outlets, or other services weighing not more than 56 pounds shall have two No. 12 gauge hangers connected from the terminal or service to the structure above. These wires may be slack.
   2. Support air inlets, outlets, or other services weighing more than 56 pounds directly from the structure above by approved hangers. Provide 4 taut 12 gauge wires each, attached to the fixture and to the structure above. The 4 taut 12 gauge wires, including their attachment to the structure above must be capable of supporting 4 times the weight of the unit.
   3. Secure air inlets and outlets to main runners of ceiling suspension system with two No. 8 sheet metal screws at opposing corners.

D. Furnish all air inlets and outlets with a baked prime coat unless otherwise noted. Provide off-white baked enamel finish on ceiling-mounted air inlets and outlets. Paint exposed mounting screws to match the material being secured.

E. Air inlets and outlets shall match all qualities of these specified including appearance, throw, noise level, adjustability, etc.

3.03 FILTER HOUSING INSTALLATION

A. Mount filters in airtight galvanized steel housings furnished by the filter manufacturer, or shop fabricated. Housings shall incorporate integral tracks to accommodate filters, and flanges for connection to duct or casing system.
   1. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames and to prevent bypass of unfiltered air.
   2. Access Doors: Hinged, with continuous gaskets on perimeter and positive-locking latch handle devices.

B. Air filters shall be accessible for cleaning or replacement.

C. Identify each filter access door with 1/2 inch high minimum stenciled letters.

3.04 TEMPORARY FILTERS

A. Provide temporary filters for fans that are operated during construction; after construction dirt has been removed from the building install new filters at no additional cost to the Owner. In addition to temporary filters at filter location, provide temporary filters on all duct openings which will operate under a negative pressure.
   1. Filters used for temporary operation shall be the same as permanent filters for the application. Filters used for duct openings may be 1 inch thick pleated media disposable type.

3.05 DAMPER INSTALLATION

A. All dampers automatically controlled by damper motors are specified under "Temperature Control System" except those specified with items of equipment.

B. Provide opposed blade manual air dampers at each branch duct connection and at locations indicated on the drawings and where necessary to control air flow for balancing system. Provide an opposed blade balancing damper in each zone supply duct. Provide an access panel or Ventlok flush type damper regulator on ceiling or wall for each concealed damper.

C. Install fusible link fire dampers full size of duct at points where shown or required.

D. Provide 18 inch x 12 inch minimum hinged access doors in ductwork and furring for easy access to each fire damper; insulated access doors in insulated ducts. Label access doors with 1/2 inch high red letters.
   1. Provide Ventlok Series 100, Durodyne, or equal access doors with hardware for convenient access to all automatic dampers and other components of the system, insulated type in insulated ducts. Provide Ventlok #202 for light duty up to 2 inch thick doors, #260 heavy-duty up to 2 inch thick doors and #310 heavy-duty for greater than 2 inch thick doors. Provide #260 hinges on all hinged and personnel access doors; include gasketing.

3.06 DUCTWORK INSTALLATION

A. General:
   1. Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections within 1/8 inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true to shape and to prevent buckling. Where possible, install ductwork to clear construction by 1/4 inch minimum, except at air inlets and outlets. Where ductwork will not clear construction, secure duct firmly to eliminate noise in the system.
   2. Duct Joints: Install duct sealers, pop rivets or sheet metal screws at each fitting and joint. Duct sealers shall be fire retardant. Sheet metal screws for joints shall be minimum #10 size galvanized.
   3. Where ductwork is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
   4. Horizontal runs of ductwork suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.
   5. Provide sheet metal angle frame at all duct penetrations to wall, floor, roof, or ceiling.
   6. Paint inside of ducts, visible through grille, dull black.
   7. Where ductwork is installed in finished areas of buildings that do not have ceilings, paint ductwork, support hangers, and air inlets and outlets to match adjacent architectural surfaces, or as directed by Architect.
   8. At the time of rough installation, or during storage on the construction site and until final startup of the heating and cooling equipment, duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal, or other methods acceptable to the enforcing agency.

B. Firestopping:

1. Pack the annular space between duct openings and ducts penetrating floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.
   a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.
2. Firestopping systems to be installed in strict accordance with manufacturer's instructions.
3. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

C. Flashing:
   1. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.
   2. Refer to Division 07 specifications and Drawings details as applicable.
   3. Flashing for penetrations of roof for mechanical items such as flues and ducts shall be coordinated with the roofing manufacturer and roofing installer for the specific roofing type. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.
      a. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.
      b. Flues and ducts shall have 24 gauge galvanized sheet metal storm collar securely clamped to the flue above the flashing.

D. Upper connection of support to wood structure shall be with wood screws or lag screws in shear fastened in the upper one half of the wood structural member. Fasteners shall conform to the following schedule:

For ducts with P/2=30"	#10 x 1-1/2" wood screw
For ducts with P/2=72"	1/4"x 1-1/2" lag screw
For ducts with P/2 over 73"	3/8"x 1-1/2" lag screw

E. Upper connection in tension to wood shall not be used unless absolutely necessary. Where deemed necessary the contractor shall submit calculations to show the size fastener and penetration required to support loads in tension from wood in accordance with the following schedule:

For ducts with P/2=30"	260 pounds per hanger
For ducts with P/2=72"	320 pounds per hanger

For ducts with P/2=96"	460 pounds per hanger
For duct with P/2 larger than 120"	NOT ALLOWED

F. Install concrete inserts for support of ductwork in coordination with formwork as required to avoid delays in work.

G. Upper connection to manufactured truss construction must comply with truss manufacturers published requirements and Structural Engineers requirements.

H. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct plus insulation with sheet metal flanges of same gauge as duct. Overlap opening on four sides by at least 1-1/2 inches.

I. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards," hangers and supports sections. Where special hanging of ductwork is detailed or shown on Drawings, Drawings shall be followed. Angles shall be attached to overhead construction in a manner so as to allow a minimum of 2 inches of movement in all directions with no bending or sagging of the angle.
   1. Except where modified in individual paragraphs of this Section, provide hanger support with minimum 18 gauge straps, 1 inch wide. Fold duct strap over at bottom of duct.
   2. Install duct supports to rectangular ducts with sheet metal screws. Provide one screw at top of duct and one screw into strap at bottom of duct.

J. Installation of Flexible Ductwork:
   1. Provide flexible ducts with supports at 30 inch centers with 2 inch wide, 26 gauge steel hanger collar attached to the structure with an approved duct hanger. Installation shall minimize sharp radius turns or offsets.
      a. Supports shall be in accordance with SMACNA HVAC Duct Construction Standards (Metal and Flexible).
      b. Flexible duct bends shall be not less than 1-1/2 duct diameter bend radius.
   2. Make connections to rigid duct and units with Panduit style draw band at inner liner material, and a second draw band over the outer vapor barrier material.
   3. Make connection to duct with spin-in fittings, with air scoop and balance damper.

3.07 DUCTWORK SEALING AND LEAK TESTING

A. All ductwork shall receive a Class A seal.

B. Seal airtight all joints and seams, including standing seams and manufactured joints and seams, of all supply, return and exhaust ducts except those exposed in conditioned space.

C. Leakage Classes:

Pressure Class	Leakage Class	
	Round Duct	Rectangular Duct
2"W.G. or less	8	16
4"W.G. or greater	2	4

D. All duct systems (supply, return, outside air intake, and exhaust), except those identified on compliance forms on Drawings as requiring Acceptance Testing per the requirements of the California Energy Code, shall be tested in accordance with the requirements of SMACNA “HVAC Air Duct Leakage Test Manual.” Test pressure shall be equal to the pressure class of the duct. For additional duct leak testing requirements, refer to Section 23 08 00.13, “Title 24 Commissioning of HVAC.”

3.08 PIPING INSTALLATION

A. General:
1. All piping shall be concealed unless shown or otherwise directed. Allow sufficient space for ceiling panel removal.
2. Installation of piping shall be made with appropriate fittings. Bending of piping will not be accepted.
3. Install piping to permit application of insulation and to allow valve servicing.
4. Where piping or conduit is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
5. Horizontal runs of pipes and conduits suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.
6. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.
7. Use reducing fittings; bushings shall not be allowed. Use eccentric reducing fittings wherever necessary to provide free drainage of lines and passage of air.
8. Verify final equipment and fixture locations for roughing-in.
9. Where piping is installed in walls within one inch of the face of stud, provide a 16 gauge sheet metal shield plate on the face of the stud. The shield plate shall extend a minimum of 1-1/2 inches beyond the outside diameter of the pipe.
10. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.
11. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.
12. Service Markers: Mark the location of each plugged or capped pipe with a 4 inch round by 30 inch long concrete marker, set flush with finish grade. Provide 2-1/2 inch diameter engraved brass plate as part of monument marker.

13. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.

B. Sleeves:
   1. Install Adjus-to-Crete, Pipeline Seal and Insulator, or equal, pipe sleeves of sufficient size to allow for free motion of pipe, 24 gauge galvanized steel. The space between pipe and sleeves through floor slabs on ground, through outside walls above or below grade, through roof, and other locations as directed shall be caulked with oakum and mastic and made watertight. The space between pipe and sleeve and between sleeve and slab or wall shall be sealed watertight.
   2. At Contractor's option, Link-Seal, Metraflex Metraseal, or equal, casing seals may be used in lieu of caulking. Wrap pipes through slabs on grade with 1 inch thick fiberglass insulation to completely isolate the pipe from the concrete.

C. Floor, Wall, and Ceiling Plates:
   1. Fit all pipes with or without insulation passing through walls, floors, or ceilings, and all hanger rods penetrating finished ceilings with chrome-plated or stainless escutcheon plates.

D. Firestopping:
   1. Pack the annular space between pipe sleeves and pipes penetrating floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.
      a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.
   2. Provide SpecSeal Systems UL fire rated sleeve/coupling penetrators for each pipe penetration or fixture opening passing through floors, walls, partitions or floor/ceiling assemblies. All Penetrators shall comply with UL Fire Resistance Directory (Latest Edition), and in accordance with CBC requirements.
   3. Sleeve penetrators shall have a built in anchor ring for waterproofing and anchoring into concrete pours or use the special fit cored hole penetrator for cored holes.
   4. Copper and steel piping shall have SpecSeal, or equal, plugs on both sides of the penetrator to reduce noise and to provide waterproofing.
   5. Firestopping systems to be installed in strict accordance with manufacturer's instructions.
   6. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

E. Flashing:
   1. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.

2. Refer to Division 07 specifications and Drawings details as applicable.
3. Flashing for penetrations of metal or membrane roof for pipes shall be coordinated with the roofing manufacturer and roofing installer for the specific roofing type.
   a. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.
   b. Furnish and install counterflashing above each flashing required. Provide Stoneman, or equal, vandalproof top and flashing combination. Elmdor/Stoneman Model 1540.
4. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.

3.09 PIPE JOINTS AND CONNECTIONS

A. General:
   1. Cutting: Cut pipe and tubing square, remove rough edges or burrs. Bevel plain ends of steel pipe.
   2. Remove scale, slag, dirt and debris from inside and outside of pipe before assembly.
   3. Boss or saddle type fittings or mechanically extracted tube joints will not be allowed.

B. Flexible Connections:
   1. Furnish and install Thermo Tech., Inc. F/J/R, Metraflex, or equal, flexible couplings with limiter bolts on piping connections to all equipment mounted on anti-vibration bases, except fan coil units under 2000 cfm, on each connection to each base mounted pump and where shown. Couplings shall be suitable for pressure and type of service.
   2. Anchor piping securely on the system side of each flexible connection.

3.10 HANGER AND SUPPORT INSTALLATION

A. General: Support ductwork, equipment and piping so that it is firmly held in place by approved iron hangers and supports, and special hangers. Hanger and support components shall support weight of ductwork, equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. Rigidly fasten hose faucets, fixture stops, compressed air outlets, and similar items to the building construction. The Architect shall approve hanger material before installation. Where building structural members do not match piping and ductwork support spacing, provide “bridging” support members firmly attached to building structural members in a fashion approved by the structural engineer.

1. Materials, design, and type numbers for support of piping per Manufacturers' Standardization Society (MSS), Standard Practice (SP)-58.
   a. Provide copper-plated or felt-lined hangers for use on uninsulated copper tubing.
2. Materials and design for ductwork support shall be per SMACNA “HVAC Duct Construction Standards, Metal and Flexible.”

B. Hanger components shall be provided by one manufacturer: B-Line, Grinnell, Unistrut, Badger, or equal.

C. Riser clamps: B-line model B3373, or equal.

D. Rubber Neoprene Pipe Isolators:
1. Pipe isolators shall comprise an internal rubber or neoprene material that isolates pipe from hanger and structure. Install at all piping located in acoustical walls. Refer to Architectural Drawings for location of acoustical walls.
2. Isolation material shall be either a rubber or neoprene material that prevents contact between the pipe and the structure. The rubber shall have between a 45 to 55 durometer rating and a minimum thickness of 1/2 inch.
3. Manufacturers:
   a. Vertical runs: Acousto-Plumb or equal.
   b. Horizontal runs: B-Line, Vibraclamp; Acousto-Plumb or equal.

E. Pipe Hanger and Support Placement and Spacing:
1. Provide a support or hanger close to each change of direction of pipe either horizontal or vertical and as near as possible to concentrated loads.
2. Vertical piping hanger and support spacing: Provide riser clamps for piping, above each floor, in contact with the floor. Provide support at joints, branches, and horizontal offsets. Provide additional support for vertical piping, spaced at or within the following maximum limits:

Pipe Diameter	Steel Threaded or Welded (Note 3)	Copper Brazed or Soldered (Notes 3, 4)	CPVC & PVC (Note 2)
1/2 - 1”	12 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)
1-1/4 - 2”	12 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)
2-1/2 - 3”	12 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)

Over 4”	12 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)

a. Note 1: Provide mid-story guides.
b. Note 2: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.
c. Note 3: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.
d. Note 4: Includes refrigerant piping, including vapor and hot gas pipes.

3. Horizontal piping, hanger and support spacing: Locate hangers and supports at each change of direction, within one foot of elbow, and spaced at or within following maximum limits:

Pipe Diameter	Steel Threaded or Welded (Note 2)	Copper Brazed or Soldered (Notes 2, 3)	CPVC & PVC (Note 1)
1/2 - 1"	6 ft.	5 ft.	3 ft.
1-1/4 - 2"	7 ft.	6 ft.	4 ft.
2-1/2 - 3"	10 ft.	10 ft.	4 ft.
Over 4"	10 ft.	10 ft.	4 ft.

a. Note 1: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.
b. Note 2: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.
c. Note 3: Includes refrigerant piping, including vapor and hot gas pipes.

4. Suspended Piping:
a. Individually suspended piping: B-Line B3690 J-Hanger or B3100 Clevis, complete with threaded rod, or equal. All hangers on supply and return piping handling heating hot water or steam shall have a swing connector at point of support.

Pipe Size	Rod Size Diameter

2" and Smaller	3/8"
2-1/2" to 3-1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

b. Suspend rods from concrete inserts with removable nuts where suspended from concrete decks. Power actuated inserts will not be allowed.
c. Trapeze Suspension: B-Line, or equal, 1-5/8 inch width channel in accordance with manufacturers' published load ratings. No deflection to exceed 1/180 of a span.
d. Trapeze Supporting Rods: Shall have a safety factor of five; securely anchor to building structure.
e. Pipe Clamps and Straps: B-Line B2000, B2400, or equal. Where used for seismic support systems, provide B-Line B2400 series, or equal, pipe straps.
f. Concrete Inserts: B-line B22-I continuous insert or B2500 spot insert. Do not use actuated fasteners for support of overhead piping unless approved by Architect.
g. Steel Connectors: Beam clamps with retainers.

5. Provide support for piping through roof, arranged to anchor piping solidly in place at the roof penetration.
6. Insulated Piping:
   a. Do not interrupt insulation at pipe hangers and clamps.
   b. Use thermal hanger shield inserts or MSS protection saddles and shields.
   c. Thermal Hanger Shield Inserts:
      1) Use thermal-hanger shield insert with clamp sized to match OD of insert.
      2) Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
      3) For below ambient services, maintain continuous vapor barrier.
      4) For Clevis or Band Hangers: Install thermal-hanger shield inserts with insulation protection shields.
      5) For Trapeze or Clamped Systems: Install thermal-hanger shield inserts with heavy-duty insulation protection shields. Install additional 180-degree galvanized shield for top of support if clamping is required.
   d. MSS Protection Saddles and Shields:
      1) MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      2) MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

3) Shield Dimensions for Pipe: Of length recommended in writing by manufacturer to prevent crushing insulation. Not less than the following:
   a) NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b) NPS 4: 12 inches long and 0.06 inch thick.
   c) NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d) NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e) NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

F. Piping Support to Structure:
1. Wood Structure: Provide and install wood blocking as required to suit structure. Provide lag screws or through bolts with length to suit requirements, and with size (diameter) to match the size of hanger rods required.
   a. Do not install Lag screws in tension without written review and acceptance by Structural Engineer.

Side Beam Angle Clip	B-Line B3062--MSS Type 34
Side Beam Angle Clip	B-Line B3060
Ceiling Flange	B-Line B3199

   b. Blocking for support of piping shall be not less than 2 inch thick for piping up to 2 inch size. Provide 3 inch blocking for piping up through 5 inch size, and 4 inch blocking for larger piping. Provide support for blocking in accordance with Structural Engineers requirements.
   c. Where lag screws are used, length of screw shall be 1/2 inch less than the wood blocking. Pre-drill starter holes for each lag screw.
2. Steel Structure: Provide and install additional steel bracing as required to suit structure. Provide through bolts with length to suit requirements of the structural components. Burning or welding on any structural member may only be done if approved by the Architect.

G. Duct Hanger and Support Spacing: Conform to Requirements of CMC and SMACNA “HVAC Duct Construction Standards, Metal and Flexible.”

H. Duct Support to Structure:
1. Upper connection of support to wood structure shall be with wood screws or lag screws in shear fastened in the upper one half of the wood structural member. Fasteners shall conform to the following schedule:

For ducts with P/2=30"	#10 x 1-1/2" wood screw
For ducts with P/2=72"	1/4"x 1-1/2" lag screw

For ducts with P/2 over 73"	3/8"x 1-1/2" lag screw

2. Upper connection in tension to wood shall not be used unless absolutely necessary. Where deemed necessary the contractor shall submit calculations to show the size fastener and penetration required to support loads in tension from wood in accordance with the following schedule:

For ducts with P/2=30"	260 pounds per hanger
For ducts with P/2=72"	320 pounds per hanger
For ducts with P/2=96"	460 pounds per hanger
For duct with P/2 larger than 120"	NOT ALLOWED

3. Install concrete inserts for support of ductwork in coordination with formwork as required to avoid delays in work.
4. Upper connection to manufactured truss construction must comply with truss manufacturers published requirements and Structural Engineers requirements.

3.11 INSULATION AND FIELD-APPLIED JACKET INSTALLATION

A. General:
1. The term "piping" used herein includes pipe, air separators, valves, strainers and fittings.
2. Clean thoroughly, test and have approved, all piping and equipment before installing insulation and/or covering.
3. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, ductwork, and equipment.
4. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment as specified in insulation system schedules.
5. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
6. Install insulation with longitudinal seams at top and bottom of horizontal runs.
7. Install multiple layers of insulation with longitudinal and end seams staggered.
8. Keep insulation materials dry during application and finishing.
9. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
10. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
11. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and

inspection. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.

12. For piping, ductwork, and equipment, with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.
13. Repair all damage to existing pipe, duct and equipment insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.
14. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
    a. Install insulation continuously through hangers and around anchor attachments.
    b. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
    c. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
    d. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

B. Duct Insulation Installation:
    1. General:
        a. Insulation applied to the exterior surface of ducts located in buildings shall have a flame spread of not more than 25 and a smoke-developed rating of not more than 50 when tested as a composite installation including insulation, facing materials, tapes and adhesives as normally applied. Material exposed within ducts or plenum shall have a flame-spread rating of not more than 25 and a smoke-developed rating of not more than 50.
        b. Duct insulation applied to the exterior surface of ducts installed outside the building insulation envelope shall meet minimum R-value of R-8 at 3 inches thickness and 3/4 pound per cubic foot density.
        c. Duct insulation applied to the exterior surface of ducts installed within the building insulation envelope shall meet minimum R-value of R-4.2 at 1-1/2 inches thickness and 3/4 pound per cubic foot density.
    2. Mineral Fiber Blanket Installation:
        a. Insulate all unlined concealed supply and return ducts with fiberglass duct wrap, manufactured as a blanket of glass fibers factory laminated to a reinforced foil/kraft vapor retarding facing. Provide 2 inch stapling and taping flange. Wrap insulation entirely around duct and secure with outward clinching staples on 6 inch centers. Provide mechanical fasteners at maximum 18 inch centers for all bottoms of duct which are greater than 24 inches. Lap all insulation joints 3" minimum. Insulate ducts installed tight

against other work before hanging in place. Seal all seams, both longitudinal and transverse, and all staple and mechanical fastener penetrations of facing with scrim backed foil tape or recommended sealant, to provide a vapor tight installation.

3. PVC Jacket Installation:
   a. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.
      1) Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.12 TEMPERATURE CONTROL SYSTEM INSTALLATION

A. Provide thermostats where indicated on drawings. All wiring shall be in conduit. Provide all relays, transformers and the like to render the control system complete and fully operable. All control conduit to be rigid steel type.

3.13 EQUIPMENT START-UP

A. Initial start-up of the systems and pumps shall be under the direct supervision of the Contractor.

B. Equipment start-up shall not be performed until the piping systems have been flushed and treated and the initial water flow balance has been completed.

C. It shall be the responsibility of the Contractor to assemble and supervise a start-up team consisting of controls contractor, start-up technician, and test and balance contractor; all to work in concert to assure that the systems are started, balanced, and operate in accordance with the design.

D. After start-up is complete, instruct the Owner's personnel in the operation and maintenance of the systems. Obtain from the Owner's representative a signed memo certifying that instruction has been received.

E. For additional requirements, refer to article, Check, Test and Start Requirements, in Section 23 00 50, Basic HVAC Materials and Methods.

3.14 TESTING AND BALANCING

A. For testing and balancing requirements, refer to Section 23 05 93, Testing and Balancing for HVAC.

3.15 CLEANING AND PROTECTION

A. As each duct section is installed, clean interior of ductwork of dust and debris. Clean external surfaces of foreign substances that might cause corrosive deterioration of metal or where ductwork is to be painted.

B. Strip protective paper from stainless steel ductwork surfaces, and repair finish wherever it has been damaged.

C. Temporary Closure: At ends of ducts that are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering that will prevent entrance of dust and debris until connections are to be completed.

D. As each internally lined duct section is installed, check internal lining for small cuts, tears, or abrasions. Repair all damage with fire retardant adhesive.

3.16 EQUIPMENT MOUNTING

A. Mount and anchor equipment in strict compliance with Drawings details. Alternate anchorage methods will not be considered for roof mounted equipment.

3.17 INDOOR DUCT INSULATION SCHEDULE

A. Ducts Located Within Building Thermal Envelope:
1. Minimum R-Value = R-4.2.
2. Supply and Return Ducts: Mineral Fiber Blanket, 1-1/2 inches thick, 0.75 lb/cu. ft.

B. Ducts Located Within Building Outside Thermal Envelope:
1. Minimum R-Value – R-8.0.
2. Supply and Return Ducts: Mineral Fiber Blanket, 3 inches thick, 0.75 lb/cu. ft.

3.18 OUTDOOR DUCT INSULATION SCHDULE.

A. Minimum R-Value = R-8.

B. Refer to article, Ductwork, for internal duct lining. Provide 2 inches thick internal duct lining where indicated on Drawings.

3.19 INDOOR FIELD-APPLIED DUCT JACKET SCHEDULE

A. Insulated ducts in concealed spaces: None.

B. Insulated ducts in exposed unconditioned spaces: PVC, 20 mils thick.

END OF SECTION

SECTION 26 00 00 - ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 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.

1.02 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.

1.03 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.

1.04 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:
1. NEMA - National Electrical Manufacturer's Association
2. ANSI - American National Standards Institute
3. ASTM - American Society for Testing Material Association
4. IPCEA - Insulated Power Cable Engineer's Association
5. 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.

1.05 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:

Spec para.,

Page(s)	Manufacturer	Model No.	Detail No.	Description
1-12	XYZ Corp	123ABC	2.5	Control panel
13,14	XYZ Corp	456DEF	2.6-A	Power supply
15	ABC Corp	789GHK	A/E9.5	Rack
16,17	Cantex	PVC-40	2.1	PVC conduit
18	Steel City	XYZ series	2.2	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.

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.

1.06 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.

1.07 ADDENDA AND CHANGE ORDERS

A. Changes in the plans and specifications shall be made by Addenda or Change Orders signed by the Engineer.

PART 2 - PRODUCTS

2.01 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

3.01 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.

3.02 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.

3.03 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.

3.04 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) of maximum dry density at optimum moisture content in layers not to exceed 6" when compacted.

3.05 PROTECTION

A. In performance of work, protect work from damage. Protect electrical equipment, stored and installed, from dust, water or other damage.

3.06 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.

3.07 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.

3.08 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.

3.09 EQUIPMENT ANCHORAGE

A. Seismic Anchorage of Electrical equipment shall conform to the regulations of CBC-2022 and ASCE 7-16, Chapters 13 and 30. 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 1613A California Building Code (CBC) 2022 and 13.3 ASCE 7-16. Forces shall be applied in the horizontal directions, which results in the most critical loadings for design.
   2. The value of 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 District Engineer 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 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

SECTION 26 05 00 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE

A. The work of this Section consists of basic materials and methods for all work included under Divisions 26, 27, and 28. Additional specifications requirements for electrical work are specified under other sections of Divisions 26, 27 and 28 and where those requirements differ from the requirements of this Section, they shall govern.

1.02 SUBMITTALS

A. Submit product data per Section 26 00 00.

PART 2 - PRODUCTS

2.01 CONDUIT

A. Rigid Steel Conduit: Standard weight, mild steel pipe, zinc coated on both inside and outside by a hot dipping or sherardizing process. Inside and outside of conduit shall be finished with a protective coating. All threads galvanized after cutting. Meets UL 6, UL Card #DYIX, and ANSI C80.1.

B. Intermediate Metallic Conduit (IMC): Intermediate weight, mild steel pipe, meeting same requirements for finish and material as rigid steel conduit. Meets UL 1242, UL Card #DYIX, and ANSI C80.6.

C. Electrical Metallic Tubing (EMT): Cold rolled steel tubing, hot-dipped galvanized, with zinc coating on outside and protective lubricating coating on inside. Fittings shall meet same requirements for finish and material as EMT. Meets UL 797 and ANSI C80.3.

D. Flexible Conduit: UL Listed. Flexible steel, zinc coated on both inside and outside by hot dipping or sherardizing process. Liquid-tight conduit shall be galvanized with extruded polyvinyl covering and with watertight connectors, sunlight resistant, direct burial rated. Flexible steel conduit less than 1/2" shall not be used except that 3/8" shall be permitted in lengths not in excess of 6 feet as part of a listed assembly or for tap connections to lighting fixtures as required in CEC Section 410-67(c). Flexible conduit to be one continuous length, no couplings. AFC Liquid-Tuff Type-LFMC and AFC Reduced Wall Flexible Steel Conduit, or equal.

E. Raceway Fittings:

1. Rigid Steel Conduit: Fittings, such as couplings, connectors, condulets, elbows, bends, etc., shall be subject to same requirements as for rigid steel conduit. Couplings and unions shall be threaded type, assembled with anti-corrosion, conductive anti-seize compound at joints made absolutely tight to exclude water. Connectors shall be threaded hubs with bonding insulated metallic bushings. Unions shall be equal to Crouse Hinds UNY or UNF.
2. IMC: Fittings shall be as specified for rigid steel conduit.
3. EMT: Fittings shall be steel, box connectors shall have insulated throat. Connectors and couplings to be compression type.
4. Flexible Metallic Conduit: Connectors to be insulated. Metallic connectors (except for liquid-tight) shall be steel "squeeze" type via a screw, Steel City XC-90X and XC-49X series. Liquid-tight metallic connectors shall be watertight approved for such use.
5. Bushings: Metallic insulated type. Weatherproof or dust-tight installations; liquid-tight with sealing ring and insulated throat, OZ/Gedney type "KR".
6. Expansion and Deflection Fittings: OZ/Gedney, Type "DX" or accepted equal.
7. All box connectors to be insulated throat type.
8. Conduit Straps: Galvanized steel, 2-hole straps. 1-hole straps may be used for conduit sizes 1" and smaller concealed in wall or above ceiling.

F. Metallic conduits, raceways, and fittings shall be listed and approved as a grounding means.

2.02 BOXES

A. Galvanized one-piece or welded pressed steel type. Boxes for fixture shall not be less than 4" square and shall be equipped with fixture stud. Boxes shall be at least 1-1/2" deep, 4" square for 1 or 2 gang devices, with plaster rings and gang box with gang cover. Boxes mounted in wall or ceiling finished with gypsum board shall be furnished with 3/4" deep plaster rings. Use screws and not nails to support/secure outlet boxes. Provide blank cover plates for all boxes without devices.
   1. 1-gang and 2-gang outlet and junction boxes installed exposed outdoors shall be weatherproof type FS, FD, WS, WD die cast metal or aluminum boxes, Appleton or equal. Plug all unused hubs.
   2. Provide an equipment grounding pigtail at all receptacles, switch, and device outlet boxes. Ground conductor size to match circuit overcurrent protection complying with CEC.
   3. Outlet boxes for data, telecommunications, video, and TV outlets shall be 4 11/16" square x 2.125" deep.
   4. Outlet boxes containing #8, #6, or #4 AWG wires shall be a minimum 2.125" deep per CEC.

B. Junction boxes located outdoors, or in wet or damp locations shall be rated NEMA-3R, with hinged door and pad-locking tabs.

C. Equipment furnished by other trade but require electrical connection shall be provided with appropriate backbox.

2.03 WIRES

A. Wire shall be copper only, manufactured by General Cable Co., Rome, General Electric Co., or Anaconda. Wire shall be rated 90 degrees C for both dry and wet locations, THWN-2, XHHW-2, or RHW-2 insulation. 90 degrees C THHN may be used in dry and damp locations. Wire installed in high temperature areas, including branch circuits in or above roof insulation or in fluorescent ballast channel, shall have type RHW-2 or XHHW-2 90° insulation.
   1. Feeders sized #2 and larger routed below grade, extending beyond or outside the building foundation line shall use types XHHW-2, THW-2, or RHW-2 insulation, 90 degrees C dry and wet rated.

B. Wire shall be Code type copper wire of not less than 98% conductivity. Wires #8 gauge and larger, shall be stranded. Wires shall bear the Underwriters' label, be color coded and be marked with gauge, type and manufacturer's name on 24" centers. Wires smaller than #8 may be solid or stranded. Where stranded wire is used, provide solid pigtail for connection to screw terminals of receptacles, switches, etc.

C. Color Coding to be as follows:

	208/120 Volts	480/277 Volts
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Grey
Ground	Green	Green

   1. Switch legs shall use the same branch circuit phase color coding which they are connected to. IG ground wire shall be green with yellow tracer.

D. Bring wire to job in original unbroken packages. Obtain approval of inspector or Engineer before installation of wires.

2.04 CONVENIENCE OUTLETS

A. Shall be "Specification" grade rated 15 amperes at 125 volts, duplex, composition base with slots to accommodate parallel plug caps with grounding peg. Contact shall grip both sides of plug prongs. Where only one receptacle is connected to a 20 ampere

circuit, a 20 ampere receptacle shall be used. Outlet shall be UL listed. Receptacles to be Hubbell or equal.

1. 15 Amp: Hubbell 5262 series Heavy Duty Industrial Grade, 8200 series for Hospital Grade.
2. 20 Amp: Hubbell 5362 series Heavy Duty Industrial Grade, 8300 series for Hospital Grade.
3. Other designations as noted below:
   a. Ground Fault: GFR
   b. Tamper Resistant: TR
   c. Weather Resistant: WR
   d. Isolated Ground: IG
4. Leviton 5252, 5352, 8200, and 8300 series can be considered equal.
5. Pass & Seymour 5252, 5352, 8200, 8300 series can be considered equal.

B. Provide devices with matching plates. Isolated ground (IG) receptacles shall be orange with matching color plate. Hospital grade receptacles shall have a distinctive "green" dot. GFI receptacles shall have a visible (light) indicator.

C. All 15 and 20 Amp, 125V and 250V non-locking receptacles (NEMA 5-15, 5-20, 6-15, 6-20) located outdoors and/or in damp or wet locations shall be listed weather-resistant type. Weather resistant receptacles shall be the same grade or class as 15A and 20A receptacles specified above.

D. Weatherproof covers for receptacles in wet locations shall be rated as weatherproof whether or not a plug is inserted (NEMA-3R), minimum 3.25" clearance from front of receptacle, metallic cast type with hinged lid and padlocking hasp, Leviton or equal. Weatherproof covers for receptacles in damp locations shall be rated as weatherproof when attachment plug is removed, with metallic cast cover and flip lids with padlocking hasp.

E. Provide a separate GFI duplex receptacle at each location identified on the drawings and as specified. Through wiring is not acceptable. Receptacles located at the following locations shall be GFI type, whether indicated in the plans or not.

1. In elevator control rooms.
2. In elevator pits/shafts.
3. In bathrooms or restrooms.
4. Outdoors, on the exterior of the building, and on/above the roof.
5. In commercial and institutional kitchens, unless dedicated to specific equipment.
6. Within 72" from any sink or basin such as in a small kitchen, lunch/break room, and the like.

F. Provide an equipment grounding jumper (pigtail) connecting the grounding terminal of the receptacle to the grounded box.

2.05 SAFETY/DISCONNECT SWITCHES

A. Type "HD" Heavy Duty safety switches with externally operated handle. Switches shall be manufactured by Westinghouse, General Electric, Square D, or approved equal. Switches shall be rated 250 and 600 volts, A.C., of size and poles as shown on Drawings and as required. Disconnects used outdoor shall be in NEMA-3R. Provide fused switches with proper sized fuses where required by equipment manufacturer. All switches shall have pad-locking cover with interlocking cover. Switches shall be capable of be pad-lockable in the ON or OFF position. Label switch with circuit identification per section 26 00 00, example "AC-1, HD1-24".

2.06 INDIVIDUAL CIRCUIT BREAKERS

A. Circuit breakers shall be molded case thermal magnetic type with trip rating as scheduled on drawings.
   1. Circuit breaker trip settings 300 amps and higher shall have Long-Time setting, STPU, STD, GFPU, Inst. PU settings. Breaker shall be solid state with field adjustable and replaceable trip rating plugs, or of the electronic type.
   2. Circuit breakers with trip settings 1200 amps and higher shall be solid state electronic type with full function trip units including: LTPU, LTD, STPU, STD, Inst PU, Inst OFF, GFPU, GFD.

B. Circuit breakers shall be quick-make, quick-break, trip free operation. The trip-free mechanism shall be independent of manual handle control. All circuit breakers shall be fully rated to withstand the available short circuit current as designated on the drawings. Series rated equipment will not be acceptable.

C. Breakers to be in NEMA-1 (indoor) or NEMA-3R (damp, wet, and outdoor) enclosures. NEMA-3R enclosures shall have the handle concealed behind the cover, and the hinged cover shall be provided with padlocking tabs. Each circuit breaker shall be identified with an engraved, laminated phenolic plate showing the load served or the function of the circuit breaker and trip rating. The nameplate shall be attached with oval head machine screws tapped into the front of the board. Equip breaker handles with padlocking "lock-off" devices.

2.07 PULL LINE

A. Furnish and install pull line in all unused (empty) raceways. Pull lines shall not rot or mildew.
   1. Conduits up to 1.5": 1/8" diameter braided line of polypropylene with 200 lbs. tensile strength, IDEAL, Jet-Line #232, or equal.
   2. Conduits 2" or Larger: 3/16" polypropolene pull rope with 800 lbs. tensile strength, IDEAL Pro-Pull or equal.

B. Provide pull line in conduits for utility company systems, size and type per their requirements.

2.08 ACCESS DOORS

A. Milcor, Newman or equal with concealed hinges, screwdriver locks, prime coated with rust inhibitive paint, and style of door to suit ceiling or wall construction, including fire rating. Access doors in acoustical tile ceilings shall be Hi-Hatch with tile recess. Doors shall be 14 gage C.R. steel and shall be 22" x 30"; 24" x 24" in tile ceilings, unless otherwise noted or required.

2.09 SURFACE METALLIC AND NONMETALLIC RACEWAYS

A. The surface raceway system for branch circuit wiring and/or data network, voice, video and other low-voltage wiring shall be manufactured by the Wiremold Company, or equal. Raceway series as indicated on the plans. The raceway and all system components must be UL listed and exhibit non-flammable self-extinguishing characteristics. The raceway shall be a two-piece design with a base and a snap-on cover.
   1. The nonmetallic raceway base and cover shall be manufactured of rigid PVC compound, available in ivory color. Exposed cuts shall be covered with cover clips.
   2. The metal raceway base and cover shall be manufactured of galvanized steel, ivory finish and suitable for field painting.

B. A full complement of fittings must be available including, but not limited to flat, internal and external elbows, tees, entrance fittings, boxes, covers, adapters, cover clips, and end caps. The fittings shall match the base and cover, and be of matching colors. All fittings shall be supplied with a base where applicable to eliminate mitering. A transition fitting shall be available to adapt to other Wiremold series raceways. Field cuts shall be clean, straight, and true with no rough edges.

C. For multicompartment raceways, device brackets shall be available for mounting standard devices in-line or offset from the raceway. A device bracket shall be available for mounting up to four devices at one location. Faceplates shall match and fit flush in the device plate and shall overlay the cover and base to hide uneven cuts. They shall match the raceway base and cover. The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP (i.e. data jacks), STP (150 ohm), Fiber Optic, Coaxial and other cabling types with face plates and bezels to facilitate mounting.

D. Work shall include furnishing all raceway and appropriate fittings and device plates to install a nonmetallic surface raceway system. Installer shall comply with detailed manufacturer's instruction sheets, which accompany system components as well as system instruction sheets.

E. Non-metallic raceway systems shall not be used in Assembly areas and other areas where the system is not rated for the installation. Assembly areas include but not limited to; gymnasiums, multipurpose rooms, auditoriums, conference rooms, etc.

2.10 COVER PLATES

A. Switch and receptacle cover plates shall be smooth nylon type. Cover plates for other devices/outlets such as data, telephone, television, etc. shall be nylon. Cover plate color shall be ivory, matching all systems.

B. For multi-purpose rooms, gymnasiums, kitchens, locker rooms, toilet/restrooms, and walls such as CMU, brick, concrete block, and concrete walls, device plates shall be smooth stainless steel with beveled edges.

C. Each receptacle shall have its circuit identification on the cover plate (i.e., "LA1-12"). Use typewritten "clear tape". Use black letters/numbers for light colored (white, almond, tan, beige, etc.) cover plates. For darker colored cover plates (black, brown, gray, red, etc.), tape to be white with black letters/numbers. Tape shall be located at the lower portion of the cover plate. Clean surface before adhesive tape is applied, and wrap tape (approx. 1") at each end around back side of each cover plate.
   1. For floor boxes, plates shall be engraved with circuit identification.
   2. For light switches, use same circuit identification method as for receptacles.

PART 3 - EXECUTION

3.01 CONDUITS & CIRCUITS

A. All conduits shall be rigid steel or IMC except EMT may be used at following locations:
   1. In dry locations in concealed furred spaces.
   2. In partitions other than concrete, concrete block, or solid masonry.
   3. For exposed work indoors and outdoors above 10 ft except:
      a. In special locations prohibited by Code, such as hazardous locations, rigid steel shall be used.
      b. Conduits exposed on/above the roof shall be rigid steel up to 10 ft above roof surface.
      c. Conduits exposed in Gymnasiums and Multi-Purpose Rooms shall be rigid steel up to 25 ft.
   4. Concealed above suspended ceilings or ceilings directly attached to structure above.

B. Flexible Conduit: Shall be used to provide flexible connections of short length (3 ft or less) to equipment subject to vibration or movement and to all motors. Up to 6 ft is allowed where additional flexibility is needed. Provide a separate bonding conductor in all flexible connections/conduit. Flexible conduit shall be one continuous length without couplings.

1. Secure flex conduit within 12" of each box, cabinet, conduit body, or other termination, and maximum 4.5 ft on center. Refer to the CEC for other secure lengths where flexibility is required or in other specific instances.

C. Run conduit concealed in areas having finished ceilings and in walls. Run all cross conduits and vertical risers or drops concealed in wall and/or partitions. Should it be necessary to notch any framing members, make such notching only at locations and in a manner as approved by the Architects. Where concealing conduit is not possible or practical, conduit may be run exposed in areas only where so permitted by the Architect. Install exposed conduit run neatly, parallel to or at right angles to structural members. Maintain a minimum of 6" clearance from steam or hot water pipes.

D. Support conduit with straps and secure to wood structure by means of bolts or lag screws, to concrete by means of insert or expansion bolts, to brickwork by means of expansion bolts, and to hollow masonry by means of toggle bolts. Expanders and shields shall be steel or malleable iron.

E. Do not install in concrete slabs.

F. Support individual conduits with 2-hole steel straps. 1-hole steel straps may be used for conduits 1" and smaller concealed in wall or above ceilings.

G. Galvanized iron hanger rods sizes 1/4" diameter and larger with spring steel fasteners, clips or clamps specifically designed for purpose for conduits up to 1" size may be used.

H. Individual conduits 3/4" and smaller run above wire suspended ceilings may be supported from independent hanger wires with approved spring steel clips. Wire ties will not be acceptable. Wire shall be taut and secured to ceiling and structure above.

I. Support multi-parallel horizontal conduit runs with trapeze type hangers consisting of two or more steel hanger rods, cross channels, J-bolts, clamps, etc.

J. Sizes of rods and cross channels shall be designed to support four times actual load. Hanger rods shall have safety factor of 5 based on ultimate strength of material used.

K. Conduits for data, telecommunications, signal, video, TV, and/or containing fiber optic, coaxial, or OSP (outside plant) multi-pair cables shall have a minimum inside bend radius per CEC Table 346-10 (do not use exception); except that conduits 2" to 4" shall be minimum 24" radius bends.

L. After installation of conductors, all conduits routed below grade shall be sealed at each opening, including risers and in pull boxes, to prevent the entrance of water and debris.

M. Conduits not terminated into a box or cabinet, such as stubbed to a backboard, shall be terminated with an insulated bushing. Bushings for metallic conduits shall be

metallic type secured by set screw, compression, or threaded type. Bushings for PVC conduits shall be glued in place.

N. Although circuiting is shown as diagrammatic, their point-to-point destinations and their indication of above/below ground route shall be followed as much as possible. Where site conditions dictate that an alternate means of routing will alleviate conflicts, the alternate means will be considered with prior approval by the Engineer.

O. Where cinder fill is encountered in Block walls, conduit shall be PVC-40 where in contact with cinder fill. Boxes shall be PVC type where in contact with cinder fill.

P. EMT conduit circuits installed on the roof, if allowed by the Engineer, shall have a ground conductor routed with the circuit conductors sized per the circuit protective device.

Q. Horizontal runs of conduit above suspended wire lay-in ceilings shall not be less than 12" above the ceiling.

R. Maintain 12 inch separation between power circuits (>120V) and all signal circuits (data, telephone, speaker, clock, etc.) to prevent interference.

S. Feeder conduits connected to panels/switchboard shall have ground lug bushing connected to equipment ground buss with ground wire same size as largest ground wire in the panel/switchboard.

T. Conduits penetrating through the roof shall be secured within 12" below roof and supported within 12" of the penetration on the roof.

U. Where conduits cross building expansion/seismic joints provide a short length of flexible conduit (do not exceed 6 ft.) and fittings listed as a grounding means, or in locations where flex conduit cannot be used provide UL listed expansion/seismic fittings.

V. Conduits concealed in any masonry shall be routed in a conduit sleeve. Such sleeves shall not be placed closer than 3 diameters, center to center.

W. Conduits to air conditioning (AC) equipment, fans, or other roof mounted equipment shall rise up from the ceiling below through the equipment curb or conduit window within the equipment, if allowed by equipment manufacturer, to prevent additional roof penetrations.

X. Where conduit passes through finished walls or ceilings, provide steel escutcheon plates, chrome or painted as directed. Conduit which penetrate floor slabs, concrete or masonry walls shall be grouted and sealed watertight at penetrations.

Y. For 20-amp 120 or 277 Volt Circuits using 90-deg C Wires:

1. Do not install more than three(3) circuits in any conduit.
2. Do not install more than six(6) current carrying conductors in any conduit.
3. Where using #10 AWG wires to allow for conductor derating:
   a. Do not install more than six(6) circuits in any conduit.
   b. Do not install more than twelve(12) current carrying conductors in any conduit.

Z. Cables and Raceways installed under metal-corrugated sheet roof decking shall maintain a minimum 1.5" from the nearest surface of the roof decking per CEC. This shall not apply to RMC or IMC.

AA. Where switches control lighting loads supplied by a grounded branch circuit, the grounded conductor for the controlled lighting circuit shall be provided at the switch location. The grounded circuit conductor can be omitted where exceptions 1 & 2 apply. (CEC 404.2(C))

3.02 CAPPING

A. Cap conduits during construction with manufactured seals. Swab out conduits before wires are pulled in.

B. Cap all empty conduits below grade and in pull boxes with manufacturer's caps to prevent entrance of water and debris, attach pull string to cap.

3.03 FLASHING

A. Make conduit projecting through roof watertight by proper flashing. Secure a sheet lead cap with a tightening bend to conduit. Use two collars for tar or asphalt composition roofings. Set one collar directly on roof deck and second collar set over on top of roofing felts. Lead sheet flashing shall be made of 4 lb. sheet lead. Use Stoneman #1100-4 series for individual conduits and #910/915 multi-flash for more than on conduit penetration, or equal.

3.04 PENETRATIONS OF FIRE RESISTIVE WALLS AND PARTITIONS

A. Penetrations of protected openings (fire rated walls, ceilings, floor-ceilings, roofs, etc.) shall be protected in accordance with the California Building Code, Part 2, Chapter 7, Title 24. Penetrations shall apply to conduits (raceways), cable trays, boxes, cabinets, panels, cables, etc.

B. Fire stopping shall be provided at penetrations of fire resistive walls, floors, ceilings, floor-ceiling assemblies, and roofs. Fire-stopping shall have a "F" and/or "T" rating as determined by tests conducted in accordance with ASTM E 814 or UL-1479. Fire stopping system/materials shall be UL Listed.

3.05 ACCESS DOORS

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of electrical systems; for example, inaccessible areas and attics containing heat detectors, junction boxes, etc. Access doors shall provide for complete removal and replacement of equipment. Provide fire rated access doors where located in fire rated partitions.

3.06 BOXES

A. Nails shall not be used to support outlet boxes. Boxes must be accurately placed for finish, independently and securely supported by adequate wood backing or by manufactured adjustable channel type heavy-duty box hangers. For metal stud construction, use metal box hangers only. Box hangers shall be securely tied or welded (where permitted) or screwed to metal studs. Paint weld with rust inhibitor. Boxes installed in masonry tile or concrete block construction shall be secured with auxiliary plates, bars or clips and be grouted in place.
   1. Outlet Boxes with Receptacles or Switches: Provide a solid pigtail (green) ground wire grounded to the metallic outlet box. Pigtail shall also ground device and separate ground conductor if available. Size of ground wire to match overcurrent protection.

B. Locate outlets at the following heights above floor to the center of the device or handle unless otherwise noted on Drawings or in Specifications.
   1. The top of the outlet box shall not be higher than 48" above finished floor, and the bottom of the outlet box shall not be less than 15" above finished floor. For forward or side approach over counter, maximum 44” and 46” respectively to top of box.
   2. Convenience Outlets: 18" (4" above counter or splash).
   3. Local Switches: 45".
   4. Telephone Outlets: 18" (45" for wall phone).
   5. Data, TV Outlets: 18".
   6. Where devices are shown at counter locations, they shall be located approximately 4" above counter, clearing back-splash where applicable.
   7. Refer to elevations and details on Architectural Drawings for exact heights and locations of all electrical outlets for switches, receptacles, special equipment, etc. Where above heights do not suit building construction or finish, consult Architect.

C. Install pull boxes or junction boxes as required in accessible spaces but do not install in finished areas unless approved by Architect.

D. Where fire rated construction is required (refer to Architectural Drawings), do not locate electrical outlet boxes back-to-back. Provide a minimum of 24" horizontal separation between outlet boxes on opposite side of the same wall. Where such restrictions

cannot be met, provide fire-stopping around box such as 3M Moldable Putty Pads or equal.

E. Boxes up to 100 cubic inches located in suspended wire ceilings may be supported through an independent hanger wire with approved tension clips. Wire shall be taut. Secure wire to the structure above and the ceiling below.

3.07 CONDUCTORS

A. Splices and joints for #10 AWG or smaller wiring shall be twisted together electrically and mechanically strong and insulated with approved type insulated electrical spring connectors, Scotchlok or Ideal. Joints and connections for #8 AWG or larger shall be made with Burndy, T & B, or approved equal, solderless tool applied pressure lugs and connectors. Uninsulated lugs and wire ends shall be insulated with layers of plastic tape equal to insulation of wire and with all irregular surfaces properly padded with "Scotchfil" putty prior to application of tape. Tape shall be equal to Scotch #33, General Electric #AW-1, or approved equal. Feeder splicing is not permitted.
   1. In special instances where feeder splicing is allowed by the Engineer, it shall be made with high compression sleeve type connector followed by manufactured splicing kit utilizing as insulators, resins poured into a ready-to-use plastic mold to provide a uniform, moisture-proof tough, impact-resistant insulation.
   2. Conductor splices below grade shall meet ANSI C119.1-1986 and UL 486D Standards. Raychem WCSM or FCSM heavy wall heat shrink tubing; or RVS or RVC series if use of flame heat is prohibited. Conductors to be joined with compression sleeve connectors.

B. Use only UL approved wire pulling compound as lubricant.

C. Lace conductors together with waxed linen lacing cord, T & B "Ty-Rap", Holub "Quik-Wrap" or equal, in a neat and workmanlike manner in panelboards, wireways, raceways, pull boxes and similar locations.

D. #12 AWG wire shall be minimum size wire used for lighting and power circuits. Motor control circuits may be #14 except as marked on Drawings, unless shown.

E. Provide cable supports in risers by means of a clamping device with insulated wedges or "Kellem" grips.

F. All conductors shall be in conduit unless otherwise indicated.

G. Conduit sizes shall be based on code fill table for THW insulated wires to accommodate the number, size, and type of wires shown or specified.

H. Wiring installed in pull boxes or junction boxes, where wire is pulled through without terminations (except splices), shall have a service loop around the interior of the box for 360 degrees utilizing the largest circumference.

I. Use #10 AWG conductor for 20 Amp 120 Volt circuit home runs longer than 75 feet, and for 20 Amp 277 Volt circuit homeruns longer than 200 feet.

J. Where conductors are increased in size and number (such as for voltage drop reasons), such that conductors will not fit the standard breaker or panel lugs, terminate conductors in one of the following means:
   1. Provide larger breaker frame or panelboard.
   2. Provide oversized lugs.
   3. Last Option only with Approval from Engineer: Terminate wires in multiport connector and provide pigtail. Splice to be made in panel or switchboard if space is available, or in separate splice box. This option will not be normally granted.

3.08 PANELS AND CABINETS

A. Recessed enclosures (panelboards, terminal cabinets, cabinets, control cabinets, etc.) shall be provided with a minimum of three 3/4" empty conduits stubbed into accessible space above the ceiling. Drawings may require additional conduits.

3.09 GROUNDING

A. Grounding and ground bonding of the electrical installation shall be in accordance with CEC Article 250, and any applicable codes. Ground fittings shall be approved manufactured type, installed and connected to conform with Code requirements.

B. Neutral conductors and noncurrent-carrying parts of equipment at each installation shall be grounded in accordance with applicable code. Ground conductor shall be copper having a current capacity sized in accordance with CEC.

C. All equipment cases, motor frames, etc., shall be completely grounded to satisfy requirements of CEC. Install bond wire in flexible conduit. Install copper bond wire, sized in accordance with CEC, in all nonmetallic raceways and bond to all metallic parts using approved fittings.

D. Service ground conductor shall be connected to a "Ufer" encased ground and bonded to the metallic cold water pipe system and to the metallic natural gas line.

E. Interior metallic cold water pipe system and other interior metallic piping systems shall be ground bonded to the building grounding system.

F. Each building shall be provided with a grounding electrode connected to the metallic enclosure of the building disconnecting means. Grounding electrode conductor shall be sized per CEC table 250-66.

G. Total ground resistance shall not exceed 25 ohms.

H. All connections shall be made with solderless connectors or molded fusion-welding process.

I. Equipment grounding conductors shall be insulated with a continuous green outer finish along its entire length. Conductors size #4 AWG and larger may be identified (with green electrical tape applied half-lapped) at each end and at every point where the conductor is accessible. Tape shall be applied from its point of entry to point of exit or termination.

J. Insulated grounded (neutral) conductors shall be identified with a continuous white outer finish along its entire length. Neutral conductors #4 AWG or larger can be identified by a distinctive white marking (applied half-lapped with white electrical tape) for the last 12 inches at each end.

3.10 FIELD TESTS

A. General: Perform field test in the presence of the Owner's Representative except as otherwise specified. Provide required labor, materials, equipment and connections to perform tests. Document results and submit them to the Owner's Representative. Repair or replace all defective work.

3.11 GROUND FAULT PROTECTION AND TESTING

A. Where indicated on the plans, provide circuit breaker with ground fault protection. The ground fault system shall include a memory circuit for positive tripping action despite intermittent arcing ground faults.

B. Provide an integral means of testing the ground fault system to meet the on-site requirements of CEC Articles 230 and 517.

C. Provide acceptance testing per InterNational Electrical Testing Association Inc. (NETA) specifications and standards. Submit test results.

3.12 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Performed in stages if directed.

B. Clean and repair soiled or damaged painted exposed work and match adjoining work before final acceptance.

C. Remove debris from inside and outside of material, equipment and structures.

3.13 WARRANTY

A. All materials and installation shall be provided with a 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.

END OF SECTION

SECTION 26 05 03 - EQUIPMENT WIRING CONNECTIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes electrical connections to equipment.

B. Related Sections:
1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cable.
2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.02 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA WD 1 - General Requirements for Wiring Devices.
2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's installation instructions.

1.04 CLOSEOUT SUBMITTALS

A. Section 01 73 00 and 017700 - Execution and Closeout Procedures.

B. Section 01 78 39 - Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.05 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.01 CORD AND PLUGS

A. Manufacturers:
   1. Leviton.
   2. Arrow Hart.
   3. Pass & Seymour.
   4. Eagle.

B. Attachment Plug Construction: Conform to NEMA WD 1.

C. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.

D. Cord Construction: Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.02 EXISTING WORK

A. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.

B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.

C. Extend existing equipment connections using materials and methods compatible with existing electrical installations.

3.03 INSTALLATION

A. Make electrical connections.

B. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Install receptacle outlet to accommodate connection with attachment plug.

E. Install cord and cap for field-supplied attachment plug.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.04 ADJUSTING

A. Section 01 73 00 and 01 77 00 - Execution and Closeout Procedures.

B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION

SECTION 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section applies to all sections of Division 26.

B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on the drawings.

C. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company’s system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company’s system, and obtain electric utility company approval for sizes and settings of these devices.

D. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

1.02 MINIMUM REQUIREMENTS

A. The latest California Building Code (CBC), Underwriters Laboratories, Inc. (UL), Institute of Electrical and Electronics Engineers (IEEE), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.

B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

1.03 TEST STANDARDS

A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in

accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:
1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: Materials and equipment which:
   a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
   b. Are periodically inspected by a NRTL.
   c. Bear a label, tag, or other record of certification.
4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

1.04 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturer’s Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.

B. Product Qualification:
1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.
2. The District reserves the right to require the Contractor to submit a list of installations where the materials and equipment have been in operation before approval.

C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within eight hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.05 APPLICABLE PUBLICATIONS

A. Applicable publications listed in all Sections of Division 26 shall be the latest issue, unless otherwise noted.

B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

1.06 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available. Materials and equipment furnished shall be new, and shall have superior quality and freshness.

B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:
1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.

E. When Factory Tests are specified, Factory Tests shall be performed in the factory by the equipment manufacturer. In addition, the following requirements shall be complied with:
1. When factory tests are successful, contractor shall furnish four (4) copies of the equipment manufacturer’s certified test reports to EOR fourteen (14) days prior to shipment of the equipment, and not more than ninety (90) days after completion of the factory tests.
2. When factory tests are not successful, factory tests shall be repeated in the factory by the equipment manufacturer. The Contractor shall be liable for all additional expenses for the EOR to witness factory re-testing.

1.07 MATERIALS AND EQUIPMENT PROTECTION

A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.

2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
3. Damaged equipment shall be repaired or replaced, as determined by the IOR.
4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.08 WORK PERFORMANCE

A. All electrical work shall comply with requirements of the latest NFPA 70 (NEC and CEC), NFPA 70B, NFPA 70E, NFPA 99, NFPA 110, OSHA Part 1910 subpart J – General Environmental Controls, OSHA Part 1910 subpart K – Medical and First Aid, and OSHA Part 1910 subpart S – Electrical, in addition to other references required by contract.

B. Job site safety and worker safety is the responsibility of the Contractor.

C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. However, energized electrical work may be performed only for the non-destructive and non-invasive diagnostic testing(s), or when scheduled outage poses an imminent hazard to patient care, safety, or physical security. In such case, all aspects of energized electrical work, such as the availability of appropriate/correct personal protective equipment (PPE) and the use of PPE, shall comply with the latest NFPA 70E, as well as the following requirements:
   1. Only Qualified Person(s) shall perform energized electrical work. Supervisor of Qualified Person(s) shall witness the work of its entirety to ensure compliance with safety requirements and approved work plan.
   2. At least two weeks before initiating any energized electrical work, the Contractor and the Qualified Person(s) who is designated to perform the work shall visually inspect, verify and confirm that the work area and electrical equipment can safely accommodate the work involved.
   3. At least two weeks before initiating any energized electrical work, the Contractor shall develop and submit a job specific work plan, and energized electrical work request to EOR and IOR. At the minimum, the work plan must include relevant information such as proposed work schedule, area of work, description of work, name(s) of Supervisor and Qualified Person(s) performing the work, equipment to be used, procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used, and exit pathways.
   4. Energized electrical work shall begin only after the Contractor has obtained written approval of the work plan, and the energized electrical work request from IOR and utility inspector. The Contractor shall make these approved documents present and available at the time and place of energized electrical work.

5. Energized electrical work shall begin only after the Contractor has invited and received acknowledgment from IOR and utility inspector to witness the work.

D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.

F. Coordinate location of equipment and conduit with other trades to minimize interference.

1.09 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. Working clearances shall not be less than specified in the CEC.

C. Inaccessible Equipment:
1. Where the Government determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

D. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.

1.10 EQUIPMENT IDENTIFICATION

A. In addition to the requirements of the CEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.

B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential

Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.

C. Install adhesive arc flash warning labels on all equipment as required by the latest NFPA 70E. Label shall show specific and correct information for specific equipment based on its arc flash calculations. Label shall show the followings:
   1. Nominal system voltage.
   2. Equipment/bus name, date prepared, and manufacturer name and address.
   3. Arc flash boundary.
   4. Available arc flash incident energy and the corresponding working distance.
   5. Minimum arc rating of clothing.
   6. Site-specific level of PPE.

1.11 SUBMITTALS

A. Submit to EOR in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. The EOR’s approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.

C. All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the EOR to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.

D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
   1. Mark the submittals per spec section 01 33 00.
   2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
   3. Submit each section separately.

E. The submittals shall include the following:
   1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.

2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion, etc.) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and attached to the equipment.
3. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
4. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.

F. Maintenance and Operation Manuals:
1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.
3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
4. The manuals shall include:
    a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
    b. A control sequence describing start-up, operation, and shutdown.
    c. Description of the function of each principal item of equipment.
    d. Installation instructions.
    e. Safety precautions for operation and maintenance.
    f. Diagrams and illustrations.
    g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
    h. Performance data.
    i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.
    j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.

G. Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.

H. After approval and prior to installation, furnish the //Resident Engineer// //COR// with one sample of each of the following:
1. A minimum 300 mm (12 inches) length of each type and size of wire and cable along with the tag from the coils or reels from which the sample was taken. The length of the sample shall be sufficient to show all markings provided by the manufacturer.
2. Each type of conduit coupling, bushing, and termination fitting.
3. Conduit hangers, clamps, and supports.
4. Duct sealing compound.
5. Each type of receptacle, toggle switch, lighting control sensor, outlet box, manual motor starter, device wall plate, engraved nameplate, wire and cable splicing and terminating material, and branch circuit single pole molded case circuit breaker.

1.12 SINGULAR NUMBER

A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.13 ACCEPTANCE CHECKS AND TESTS

A. The Contractor shall furnish the instruments, materials, and labor for tests.

B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer’s representatives and technicians so that a complete, functional, and operational system is delivered to the District.

C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests for the equipment. Repair, replacement, and re-testing shall be accomplished at no additional cost to the District.

1.14 WARRANTY

A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer for the District.

1.15 INSTRUCTION

A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.

B. Furnish the services of competent and factory-trained instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be factory-trained in operating theory as well as practical operation and maintenance procedures.

C. A training schedule shall be developed and submitted by the Contractor and approved by the District at least 30 days prior to the planned training.

END OF SECTION

SECTION 26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.02 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures.

B. Field quality-control test reports.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with CEC.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02 CONDUCTORS AND CABLES

A. Manufacturers:
   1. American Insulated Wire Corp.; a Leviton Company.
   2. General Cable Corporation.
   3. Southwire Company.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction and ratings.

C. Conductor Material: Copper complying with NEMA WC 5 or 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

D. Conductor Insulation Types: Type THW, THHN-THWN2 or XHHW2 complying with NEMA WC 5 or 7.

E. Multiconductor Cable: Metal-clad cable, Type MC with ground wire. MC shall not be used unless approved prior to installation by the school district.

2.03 CONNECTORS AND SPLICES

A. Manufacturers:
1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.01 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type XHHW-2, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspaces: Type THHN-THWN 2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway. Metal-clad cable, Type MC shall not be used without notice of approval from the school district.

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN2, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

J. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.02 INSTALLATION

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Section 26 05 00 "Common Work Results for Electrical."

F. Seal around cables penetrating fire-rated elements according to Section 07 84 13 “Penetration Firestopping.”

G. Identify and color-code conductors and cables according to Section 26 05 00 “Common Work Results for Electrical."

H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.03 FIELD QUALITY CONTROL

A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
2. Test results that comply with requirements.

3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Requirements specified in this Section may be supplemented by requirements of other Sections.

1.02 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures.

B. Product Data: For ground rods.
   1. Field quality-control test reports.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled under UL 467 as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.04 GROUNDING ELECTRODE SYSTEM

A. Metal underground water pipe.

B. Metal frame of the building.

C. Concrete-encased electrode.

D. Rod electrode.

1.05 PERFORAMNCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms.

1.06 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures.

B. Product Data: Provide data for grounding electrodes and connections.

C. Test Reports: Indicate all resistance to ground and resistance of each electrode.

D. Manufacturer's Instructions: Include all instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cadweld.
2. Thermoweld.
3. Copperweld Corp.
4. Dossert Corp.
5. Erico Inc.; Electrical Products Group.
6. Galvan Industries, Inc.
7. Harger Lightning Protection, Inc.
8. Hastings Fiber Glass Products, Inc.
9. ILSCO.
10. Kearney/Cooper Power Systems.
11. Korns, C. C. Co.; Division of Robroy Industries.
12. Lyncole XIT Grounding.
13. O-Z/Gedney Co.; a business of the EGS Electrical Group.
14. Burndy "Hyground" compression system
15. Thomas & Betts, compression system

2.02 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 26 05 19 "Low-Voltage Power Conductors and Cables."

B. Equipment Grounding Conductors: Insulated with green-colored insulation.

C. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

D. Grounding Electrode Conductors: Stranded cable.

E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

F. Bare, Solid-Copper Conductors: ASTM B 3.

G. Assembly of Bare, Stranded-Copper Conductors: ASTM B 8.

H. Bare, Tinned-Copper Conductors: ASTM B 33.

I. Copper Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

J. Copper Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

K. Tinned-Copper Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

L. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulated spacer.

M. Connectors: Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items. Exothermic-welded type, in kit form, selected per manufacturer's written instructions.

N. Foundation Electrode: 4/0 AWG.

2.3 ROD ELECTRODES

A. Ground Rods: Copper-clad steel.
1. Size: 3/4 inch diameter by 120 inches.
2. Manufacturer: Blackburn; Eritech; Or equal.

2.4 GROUNDING WELL COMPONENTS

A. Well Pipe: 12 inch diameter by 24 inches long concrete pipe with belled end.

B. Well Cover: Cast iron with legend 'GROUND" embossed cover.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.

D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

E. Equipment Grounding Conductors: Comply with CEC, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by CEC are indicated.
   1. Install insulated equipment grounding conductors in feeders.
   2. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
   3. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
   4. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
      a. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.
      b. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

F. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.
   1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
   2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except as otherwise indicated. Make connections without exposing steel or damaging copper coating.

G. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

H. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers or supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

I. Connections: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
   1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
   2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
6. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
7. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
8. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
9. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
10. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
11. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

J. Manholes and Handholes: Install a driven ground rod close to wall and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide a No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nontrunk grout.

K. Connections to Manhole Components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

3.02 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:
   1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
   2. Test completed grounding system at each location where a maximum ground-resistance level is indicated and at service disconnect enclosure grounding terminal. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
   3. Provide drawings locating each ground rod, ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results. Nominal maximum values are as follows:
      a. Equipment Rated 500 kVA and Less: 10 ohms.
      b. Equipment Rated 500 to 1000 kVA: 5 ohms.
      c. Equipment Rated More Than 1000 kVA: 3 ohms.
      d. Manhole Grounds: 10 ohms.

END OF SECTION

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
1. Steel slotted support systems.
2. Aluminum slotted support systems.
3. Nonmetallic slotted support systems.
4. Conduit and cable support devices.
5. Support for conductors in vertical conduit.
6. Structural steel for fabricated supports and restraints.
7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
8. Fabricated metal equipment support assemblies.

B. Related Requirements:
1. Section 26 05 48.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
a. Slotted support systems, hardware, and accessories.
b. Clamps.
c. Hangers.
d. Sockets.
e. Eye nuts.
f. Fasteners.
g. Anchors.
h. Saddles.
i. Brackets.
2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
   1. Hangers. Include product data for components.
   2. Slotted support systems.
   3. Equipment supports.
   4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.
   1. Include design calculations and details of hangers.
   2. Include design calculations for seismic restraints.

1.04 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Suspended ceiling components.
   2. Ductwork, piping, fittings, and supports.
   3. Structural members to which hangers and supports will be attached.
   4. Size and location of initial access modules for acoustical tile.
   5. Items penetrating finished ceiling, including the following:
      a. Luminaires.
      b. Air outlets and inlets.
      c. Speakers.
      d. Sprinklers.
      e. Access panels.
      f. Projectors.

B. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Welding certificates.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M.
   2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design hanger and support system.

B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event."
   2. Component Importance Factor: 1.5 or 1.0.

C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame Rating: Class 1.
   2. Self-extinguishing according to ASTM D 635.

2.02 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
   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. Allied Tube & Conduit; a part of Atkore International.
      b. B-line, an Eaton business.
      c. ERICO International Corporation.
      d. Flex-Strut Inc.
      e. GS Metals Corp.
      f. G-Strut.
      g. Haydon Corporation.
      h. Metal Ties Innovation.
      i. Thomas & Betts Corporation; A Member of the ABB Group.
      j. Unistrut; Part of Atkore International.
      k. Wesanco, Inc.
   2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.

3. Material for Channel, Fittings, and Accessories: Galvanized steel.
1. Channel Width: Selected for applicable load criteria 1-5/8 inches, 1-1/4 inches, 13/16 inches.
2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
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. Cooper Industries, Inc.
   b. Flex-Strut Inc.
   c. Haydon Corporation.
   d. MKT Metal Manufacturing.
   e. Thomas & Betts Corporation; A Member of the ABB Group.
   f. Unistrut; Part of Atkore International.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Channel Material: 6063-T5 aluminum alloy.
4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
5. Channel Width: Selected for applicable load criteria 1-5/8 inches, 1-1/4 inches, 13/16 inches.
6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c., in at least one surface.
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. Allied Tube & Conduit; a part of Atkore International.
   b. B-line, an Eaton business.
   c. Fabco Plastics Wholesale Limited.
   d. G-Strut.

e. Haydon Corporation.
f. Seasafe, Inc.; AMICO, a Gibraltar Industries Company.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Channel Width: Selected for applicable load criteria 1-5/8 inches, 1-1/4 inches or 13/16 inches.
4. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
5. Fitting and Accessory Materials: Same as those for channels and angles, except metal items may be stainless steel.
6. Rated Strength: Selected to suit applicable load criteria.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1) Hilti, Inc.
2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
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) B-line, an Eaton business.
2) Empire Tool and Manufacturing Co., Inc.

3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All Stainless - steel springhead type.
7. Hanger Rods: Threaded steel.

2.03 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.01 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
1. NECA 1.
2. NECA 101
3. NECA 102.
4. NECA 105.
5. NECA 111.

B. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with two-bolt conduit clamps or single-bolt conduit clamps

F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.02 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC and RMC may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
   6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
   7. To Light Steel: Sheet metal screws.

8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:
1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in Section 09 91 13 "Exterior Painting"/Section 09 91 23 "Interior Painting" and Section 09 96 00 "High-Performance

Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.02 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures.

B. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets indicated.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with CEC.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturer's specified.

2.02 METAL CONDUIT AND TUBING

A. Manufacturers:
   1. AFC Cable Systems, Inc.
   2. Alflex Inc.
   3. Anamet Electrical, Inc.; Anaconda Metal Hose.
   4. Electri-Flex Co.
   5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
   6. LTV Steel Tubular Products Company.
   7. Manhattan/CDT/Cole-Flex.

8. O-Z Gedney; Unit of General Signal.
9. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1.

C. Aluminum Rigid Conduit: ANSI C80.5.

D. IMC: ANSI C80.6.

E. EMT and Fittings: ANSI C80.3.
1. Fittings: Compression type.

F. FMC: Aluminum.

G. LFMC: Flexible steel conduit with PVC jacket.

H. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.03 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:
1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; Division of Hubbell, Inc.
12. Spiralduct, Inc./AFC Cable Systems, Inc.
13. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.04 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
1. Manufacturers:
a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
b. Thomas & Betts Corporation.

c. Walker Systems, Inc.; Wiremold Company (The).
d. Wiremold Company (The); Electrical Sales Division.

B. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.05 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers:
1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. RACO; Division of Hubbell, Inc.
8. Robroy Industries, Inc.; Enclosure Division.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

E. Floor Boxes: Cast metal, fully adjustable, rectangular.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

I. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.06 FACTORY FINISHES

A. Finish: For raceway, enclosures, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

A. Outdoors:
   1. Exposed: Rigid steel or IMC.
   2. Concealed: Rigid steel or IMC.
   3. Underground, Single Run: RNC.
   4. Underground, Grouped: RNC.
   5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
   6. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:
   1. Exposed: EMT.
   2. Concealed: EMT.
   3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
   4. Damp or Wet Locations: Rigid steel conduit.
   5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
      a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

C. Minimum Raceway Size: 1/2-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
   2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

E. Do not install aluminum conduits embedded in or in contact with concrete.

3.02 INSTALLATION

A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

B. Complete raceway installation before starting conductor installation.

C. Support raceways as specified in Section 26 05 00 "Common Work Results For Electrical."

D. Install temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.

F. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
   1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.
   1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
   2. Space raceways laterally to prevent voids in concrete.
   3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
   4. Change from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
   1. Run parallel or banked raceways together on common supports.
   2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

J. Join raceways with fittings designed and approved for that purpose and make joints tight.
   1. Use insulating bushings to protect conductors on all raceways 2” and larger.

K. Tighten set screws of threadless fittings with suitable tools.

L. Terminations:
   1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
   2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

N. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

O. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where otherwise required by CEC.

P. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

Q. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semi recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

R. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

S. Set floor boxes level and flush with finished floor surface.

T. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.03 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 09 00 - CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide electrical connections to various equipment. Such equipment includes motors, kitchen equipment, owner furnished equipment, etc. that is specified in other divisions of this specification. In addition, provide all controls and instrumentation as shown and specified.

1.02 WORK NOT INCLUDED UNDER THIS SECTION

A. Temperature control conduit and wiring included under Divisions 22 PLUMBING and 23 MECHANICAL, except as otherwise specified hereinafter.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. As specified in Section 26 05 00, BASIC ELECTRICAL MATERIALS AND METHODS.

B. Combination Load Equipment: Provide overcurrent protection for multi-motor and combination load equipment in conformance with U.L. requirements. Provide overcurrent protective device in accordance with manufacturer's data plate attached to equipment actually installed whether shown or not without an increase in Contract Sum.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide all conduit and wiring from panelboards and/or the overcurrent protective device to kitchen, mechanical, owner furnished, and other equipment and make connection to equipment, motors, VFD's, and associated control apparatus as specified in the individual specification sections.

B. Provide connections to starters, variable frequency drives, controllers, and other related equipment for various motor units requiring electrical connection that is supplied as part of the work of other sections. Include the necessary anchors, sleeves and similar items to facilitate proper installation of the system.

C. Check and verify locations of all power operated devices and their related controls; coordinate with the work of other sections, and provide required overload protection, circuit and control conductors (except temperature controls) to each and all locations. Do not proceed with work without first verifying the accuracy of data.

D. Temperature Control Conduit and Wiring: Provided as part of the work of Divisions 22 PLUMBING and 23 MECHANICAL, including all interlock wiring between motor starter and temperature control equipment; however, if a device such as pneumatic electric relay is used as a motor starter on a branch circuit run, provide and connect branch circuit to device and from this device to motor. Provide control wiring between starters and pushbuttons or other manual starter switches and branch circuit power supply required for temperature control system.

E. Wiring: Except for temperature control wiring, encompass the correct installation of all overload protection, control wiring and adequate power supply, and proper operation of all electrical equipment associated with the mechanical equipment.
   1. The responsibility for correctness of electrical connections and protective devices described hereinbefore, for operation of equipment furnished, installed or modified as part of the work of other sections shall be that of the other sections.
   2. Before permitting operation of any equipment which is furnished, installed or modified under work of other sections, review all wiring connections which have an influence on equipment of work, and verify that these connections are correct. Ensure that overload protection devices installed are of correct type, rating and setting to properly protect said equipment.
   3. Provide and install branch circuits and switches. Connect every electrical load wherever shown.

3.02 OVERLOAD PROTECTION

A. When not furnished as part of the work of other sections as part of packaged mechanical equipment units or as a separate magnetic starter, include thermal overload protection as follows:
   1. For all motors 1/8 horsepower and larger that are controlled manually except as shown.
   2. For all motors 1/30 horsepower and larger that are controlled automatically by means of such devices as thermostats, aquastats, time switches, pressure switches, float switches or other similar devices.
   3. For all motors 1/30 horsepower and larger that are controlled manually out of sight of controller or more than 50 feet away.
   4. Install proper thermal protection and disconnects in accordance with applicable CEC requirements for motors.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
1. Straight-blade convenience, hospital-grade, isolated-ground, and tamper-resistant receptacles.
2. USB charger devices.
3. GFCI receptacles.
4. Twist-locking receptacles.
5. Pendant cord-connector devices.
6. Cord and plug sets.
7. Toggle switches.
8. Decorator-style convenience.
9. Wall switch sensor light switches with ultrasonic sensors.
10. Digital timer light switches.
11. Wall-box dimmers.
12. Wall plates.
13. Floor service outlets.
14. Poke-through assemblies.
15. Prefabricated multioutlet assemblies.
16. Service poles.

1.03 DEFINITIONS

A. Abbreviations of Manufacturers' Names:
1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
3. Leviton: Leviton Mfg. Company, Inc.
4. Pass & Seymour: Pass& Seymour/Legrand.

B. BAS: Building automation system.

C. EMI: Electromagnetic interference.

D. GFCI: Ground-fault circuit interrupter.

E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

F. RFI: Radio-frequency interference.

G. SPD: Surge protective device.

H. UTP: Unshielded twisted pair.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.05 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.01 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
   1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
   2. Devices shall comply with the requirements in this Section.

D. Devices for Owner-Furnished Equipment:
   1. Receptacles: Match plug configurations.
   2. Cord and Plug Sets: Match equipment requirements.

E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.02 STRAIGHT-BLADE RECEPTACLES

A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
   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:
   2. Eaton (Arrow Hart).
      a. Hubbell Incorporated; Wiring Device-Kellems.
      b. Leviton Manufacturing Co., Inc.
      c. Pass & Seymour/Legrand (Pass & Seymour).

B. Hospital-Grade, Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: Single-piece, rivet-less, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.

C. Isolated-Ground, Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

D. Tamper-Resistant Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

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. Eaton (Arrow Hart).
   b. Hubbell Incorporated; Wiring Device-Kellems.
   c. Leviton Manufacturing Co., Inc.
   d. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Labeled and complying with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

2.03 USB CHARGER DEVICES

A. Tamper-Resistant, USB Charger Receptacles: 12 V dc, 2.0 A, USB Type A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 1310, and FS W-C-596.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: Single-piece, rivet-less, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
   3. USB Receptacles: Type A.
   4. Line Voltage Receptacles: two pole, three wire, and self-grounding.

B. Hospital-Grade, USB Charger Receptacles: 12 V dc, 2.0 A, USB Type A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, UL 1310, and FS W-C-596.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: Labeled and complying with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.
   3. USB Receptacles: Type A.
   4. Line Voltage Receptacles: two-pole, three wire, and self-grounding.

2.04 GFCI RECEPTACLES

A. General Description:

1. 125 V, 20 A, straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles:
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. Eaton (Arrow Hart).
   b. Hubbell Incorporated; Wiring Device-Kellems.
   c. Leviton Manufacturing Co., Inc.
   d. Pass & Seymour/Legrand (Pass & Seymour).

C. Tamper-Resistant, Duplex GFCI Convenience Receptacles:
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. Hubbell Incorporated; Wiring Device-Kellems.
   b. Pass & Seymour/Legrand (Pass & Seymour).

D. Hospital-Grade, Duplex GFCI Convenience Receptacles: Comply with UL 498 Supplement sd.
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. Eaton (Arrow Hart).
   b. Hubbell Incorporated; Wiring Device-Kellems.
   c. Leviton Manufacturing Co., Inc.
   d. Pass & Seymour/Legrand (Pass & Seymour).

2.05 SPD RECEPTACLES

A. General Description: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 1449, and FS W-C-596, with integral SPD in line to ground, line to neutral, and neutral to ground.
1. 125 V, 20 A, straight-blade type.
2. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
3. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

2.06 TWIST-LOCKING RECEPTACLES

A. Twist-Lock, Single Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).

B. Twist-Lock, Isolated-Ground, Single Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Grounding: Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.07 PENDANT CORD-CONNECTOR DEVICES

A. Description:
   1. Matching, locking-type plug and receptacle body connector.
   2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
   3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
   4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.08 CORD AND PLUG SETS

A. Description:
   1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.09 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:
1. Single Pole:
   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) Eaton (Arrow Hart).
      2) Hubbell Incorporated; Wiring Device-Kellems.
      3) Leviton Manufacturing Co., Inc.
      4) Pass & Seymour/Legrand (Pass & Seymour).
2. Two Pole:
   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) Eaton (Arrow Hart).
      2) Hubbell Incorporated; Wiring Device-Kellems.
      3) Leviton Manufacturing Co., Inc.
      4) Pass & Seymour/Legrand (Pass & Seymour).
3. Three Way:
   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) Eaton (Arrow Hart).
      2) Hubbell Incorporated; Wiring Device-Kellems.
      3) Leviton Manufacturing Co., Inc.
      4) Pass & Seymour/Legrand (Pass & Seymour).
4. Four Way:
   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) Eaton (Arrow Hart).
      2) Hubbell Incorporated; Wiring Device-Kellems.
      3) Leviton Manufacturing Co., Inc.
      4) Pass & Seymour/Legrand (Pass & Seymour).

C. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).

D. Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).

E. Tamper-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.

F. Tamper-Resistant and Weather-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section, when installed in wet and damp locations.

G. GFCI, Non-Feed-Through Type, Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).

H. GFCI, Tamper-Resistant and Weather-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.

I. Toggle Switches: Square Face, 120/277 V, 15 A; comply with NEMA WD 1, UL 20, and FS W-S-896.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).

J. Lighted Toggle Switches: Square Face, 120 V, 15 A; comply with NEMA WD 1 and UL 20.
   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. Eaton (Arrow Hart).
      b. Hubbell Incorporated; Wiring Device-Kellems.
      c. Leviton Manufacturing Co., Inc.
      d. Pass & Seymour/Legrand (Pass & Seymour).
   2. Description: With LED-lighted handle, illuminated when switch is off.

2.10 WALL SWITCH SENSOR LIGHT SWITCH, ULTRASONIC

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. Eaton (Arrow Hart).
2. Hubbell Incorporated; Wiring Device-Kellems.
3. Leviton Manufacturing Co., Inc.

B. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using ultrasonic technology.
1. Connections: Provisions for connection to BAS.
2. Connections: Hard wired.
3. Connections: Wireless.
4. Rated 960 W at 120-V ac for tungsten lighting, 10 A at 120-V ac or 10 A at 277-V ac for fluorescent or LED lighting, and 1/4 hp at 120-V ac.
5. Integral relay for connection to BAS.
6. Adjustable time delay of 20 minutes.
7. Able to be locked to Manual-On mode.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
9. Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.11 DIGITAL TIMER LIGHT SWITCH

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. Eaton (Arrow Hart).
2. Hubbell Incorporated; Wiring Device-Kellems.
3. Leviton Manufacturing Co., Inc.

B. Description: Switchbox-mounted, combination digital timer and conventional switch lighting-control unit, with backlit digital display, with selectable time interval in 10-minute increments.
1. Rated 960 W at 120-V ac for tungsten lighting, 10 A at 120-V ac or 10 A at 277-V ac for fluorescent or LED lighting, and 1/4 hp at 120-V ac.
2. Integral relay for connection to BAS.

2.12 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.

C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
   1. 600 W; dimmers shall require no derating when ganged with other devices.

D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

E. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.13 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.
   1. Plate-Securing Screws: Metal with head color to match plate finish.
   2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
   3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
   4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with lockable cover.

2.14 POKE-THROUGH ASSEMBLIES

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. Hubbell Incorporated; Wiring Device-Kellems.
   2. Pass & Seymour/Legrand (Pass & Seymour).
   3. Square D; by Schneider Electric.
   4. Wiremold / Legrand.

B. Description:
   1. Factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
   2. Comply with UL 514 scrub water exclusion requirements.
   3. Service-Outlet Assembly: Pedestal type with services indicated complying with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling."
   4. Size: Selected to fit nominal cored holes in floor and matched to floor thickness.
   5. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
   6. Closure Plug: Arranged to close unused cored openings and reestablish fire rating of floor.

7. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, four-pair cables that comply with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling."

2.15 PREFABRICATED MULTIOUTLET ASSEMBLIES

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. Hubbell Incorporated; Wiring Device-Kellems.
2. Wiremold / Legrand.

B. Description:
1. Two-piece surface metal raceway, with factory-wired multioutlet harness.
2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

C. Raceway Material: Metal, with manufacturer's standard finish.

2.16 FINISHES

A. Device Color:
1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.
3. SPD Devices: Blue.
4. Isolated-Ground Receptacles: Orange.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:
1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:
1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
   a. Cut back and pigtail or replace all damaged conductors.
   b. Straighten conductors that remain and remove corrosion and foreign matter.
   c. Pig-tailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:
1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:
1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors online and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.03 IDENTIFICATION

A. Comply with Section 26 05 53 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.04 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

C. Perform the following tests and inspections:
1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

D. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.

2. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
3. Using the test plug, verify that the device and its outlet box are securely mounted.

E. Wiring device will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
1. Fusible switches.
2. Nonfusible switches.
3. Receptacle switches.
4. Shunt trip switches.
5. Molded-case circuit breakers (MCCBs).
6. Molded-case switches.
7. Enclosures.

1.03 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF and electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.
1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Data: Certificates, for enclosed switches and circuit breakers, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF and electronic format.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.09 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
   2. Altitude: Not exceeding 6600 feet.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: three year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.02 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

2.03 FUSIBLE SWITCHES

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. ABB Inc.
   2. Eaton.
   3. General Electric Company.
   4. SIEMENS Industry, Inc.; Energy Management Division.
   5. Square D; by Schneider Electric.

B. Type HD, Heavy Duty:
   1. Single throw.
   2. Three pole.
   3. 600-V ac.
   4. 200 A and smaller.
   5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
   6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
   3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
   4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
   5. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 24-V ac
   6. Hookstick Handle: Allows use of a hookstick to operate the handle.
   7. Lugs: Mechanical/Compression type, suitable for number, size, and conductor material.
   8. Service-Rated Switches: Labeled for use as service equipment.

2.04 NONFUSIBLE SWITCHES

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. Eaton.
   2. General Electric Company.
   3. SIEMENS Industry, Inc.; Energy Management Division.

4. Square D; by Schneider Electric.

B. Type GD, General Duty, Three Pole, Single Throw, 240-V ac, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Type HD, Heavy Duty, Three Pole, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

F. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 24-V ac
6. Hookstick Handle: Allows use of a hookstick to operate the handle.
7. Lugs: Mechanical/Compression type, suitable for number, size, and conductor material.
8. Service-Rated Switches: Labeled for use as service equipment.

2.05 RECEPTACLE SWITCHES

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. Eaton.
2. General Electric Company.
3. SIEMENS Industry, Inc.; Energy Management Division.
4. Square D; by Schneider Electric.

B. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: 600-V ac, 30, 60, 100 A; UL 98 and NEMA KS 1; horsepower rated, with clips or bolt pads to accommodate specified fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

C. Type HD, Heavy-Duty, Three Pole, Single-Throw Nonfusible Switch: 600-V ac, 30, 60, 100 A; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.

E. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).

F. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
   3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
   4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
   5. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 24-V ac.
   6. Hookstick Handle: Allows use of a hookstick to operate the handle.
   7. Lugs: Mechanical/Compression type, suitable for number, size, and conductor material.
   8. Service-Rated Switches: Labeled for use as service equipment.

2.06 SHUNT TRIP SWITCHES

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. Bussmann, an Eaton business.
   2. Littelfuse, Inc.
   3. Mersen USA.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with Class J fuse block and 200-kA interrupting and short-circuit current rating.

C. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: 600-V ac, 30, 60, 100 A; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, with clips or bolt pads to accommodate specified fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Type HD, Heavy-Duty, Three Pole, Single-Throw Nonfusible Switch: 600-V ac, 30, 60, 100 A; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

E. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power transformer or source of enough capacity to operate shunt trip, pilot, indicating and control devices.

F. Accessories:
1. Oiltight key switch for key-to-test function.
2. Oiltight red ON pilot light.
3. Isolated neutral lug; 100 or 200 percent rating.
4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
5. Form C alarm contacts that change state when switch is tripped.
6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac or 24-V dc coil voltage.
7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.
8. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
9. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
10. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
11. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 24-V ac.
12. Hookstick Handle: Allows use of a hookstick to operate the handle.
13. Lugs: Mechanical/Compression type, suitable for number, size, and conductor material.
14. Service-Rated Switches: Labeled for use as service equipment.

2.07 MOLDED-CASE CIRCUIT BREAKERS

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. Eaton.
2. General Electric Company.

3. NOARK Electric North America.
4. SIEMENS Industry, Inc.; Energy Management Division.
5. Square D; by Schneider Electric.

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated. Circuit breaker/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end-use equipment along with the statement "Caution - Series Rated System. _____ Amps Available. Identical Replacement Component Required."

E. MCCBs shall be equipped with a device for locking in the isolated position.

F. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below, 167 deg F rated wire, 194 deg F rated wire, sized according to the 167 deg F temperature rating in NFPA 70.

G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.

H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

J. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
1. Instantaneous trip.
2. Long- and short-time pickup levels.

3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I-squared t response.

K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

L. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

M. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

N. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

O. Features and Accessories:
1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical/Compression type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered or remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Communication Capability: Circuit-breaker-mounted, Universal-mounted or Integral communication module with functions and features compatible with power monitoring and control system, specified in Section 26 09 13 "Electrical Power Monitoring and Control."
6. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
7. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
8. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
9. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.
10. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
11. Zone-Selective Interlocking: Integral with ground-fault trip unit; for interlocking ground-fault protection function.
12. Electrical Operator: Provide remote control for on, off, and reset operations.

13. Accessory Control Power Voltage: Integrally mounted, self-powered.

2.08 MOLDED-CASE SWITCHES

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. Eaton.
   2. General Electric Company.
   3. NOARK Electric North America.
   4. SIEMENS Industry, Inc.; Energy Management Division.
   5. Square D; by Schneider Electric.

B. Description: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.

C. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.

D. Features and Accessories:
   1. Standard frame sizes and number of poles.
   2. Lugs:
      a. Mechanical/Compression type, suitable for number, size, trip ratings, and conductor material.
      b. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below, 167 deg F rated wire, 194 deg F rated wire, sized according to the 167 deg F temperature rating in NFPA 70.
   3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
   4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
   5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
   6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
   7. Alarm Switch: One NC contact that operates only when switch has tripped.
   8. Key Interlock Kit: Externally mounted to prohibit switch operation; key shall be removable only when switch is in off position.
   9. Zone-Selective Interlocking: Integral with ground-fault shunt trip unit; for interlocking ground-fault protection function.
   10. Electrical Operator: Provide remote control for on, off, and reset operations.
   11. Accessory Control Power Voltage: Integrally mounted, self-powered.

2.09 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1 or gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R)

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover or directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R). The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

F. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.02 PREPARATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
   1. Notify Architect, Construction Manager and Owner no fewer than seven days in advance of proposed interruption of electric service.
   2. Indicate method of providing temporary electric service.
   3. Do not proceed with interruption of electric service without Architect, Construction Manager and Owner written permission.
   4. Comply with NFPA 70E.

3.03 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
   1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
   2. Outdoor Locations: NEMA 250, Type 3R.
   3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
   4. Other Wet o Damp, Indoor Locations: NEMA 250, Type 4.
   5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
   6. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7 with cover attached by Type 316 stainless steel bolts.

3.04 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices.

F. Comply with NFPA 70 and NECA 1.

3.05 IDENTIFICATION

A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
   1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
   2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.06 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

D. Perform tests and inspections with the assistance of a factory-authorized service representative.

E. Tests and Inspections for Switches:
   1. Visual and Mechanical Inspection:
      a. Inspect physical and mechanical condition.
      b. Inspect anchorage, alignment, grounding, and clearances.
      c. Verify that the unit is clean.
      d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
      e. Verify that fuse sizes and types match the Specifications and Drawings.
      f. Verify that each fuse has adequate mechanical support and contact integrity.
      g. Inspect bolted electrical connections for high resistance using one of the two following methods:
         1) Use a low-resistance ohmmeter.
            a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
         2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
            a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:
   a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
   b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
   c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
   d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
   e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

F. Tests and Inspections for Molded Case Circuit Breakers:
   1. Visual and Mechanical Inspection:
      a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
      b. Inspect physical and mechanical condition.
      c. Inspect anchorage, alignment, grounding, and clearances.
      d. Verify that the unit is clean.
      e. Operate the circuit breaker to ensure smooth operation.
      f. Inspect bolted electrical connections for high resistance using one of the two following methods:
         1) Use a low-resistance ohmmeter.
            a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
         2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.
h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:
   a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
   b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
   c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
   d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.
   e. Determine the following by primary current injection:
      1) Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
      2) Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
      3) Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
      4) Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.
   f. Test functionality of the trip unit by means of primary current injection. Pickup values and trip characteristics shall be as specified and within manufacturer's published tolerances.

g. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall be as indicated by manufacturer.
h. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.
i. Verify operation of charging mechanism. Investigate units that do not function as designed.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
4. Perform the following infrared scan tests and inspections and prepare reports:
   a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
   b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
   c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

G. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

H. Prepare test and inspection reports.
1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.07 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 26 05 73.16 "Coordination Studies."

END OF SECTION

SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnish and install a complete lighting system consisting of LED luminaires, automatic wall switches, occupancy sensors, and appurtenances as shown on drawings and specified.

1.02 WORK INCLUDED

A. The requirements of Sections 26 00 00 and 26 05 00 shall apply to the Work of this Section.

1.03 QUALITY ASSURANCE

A. All materials shall comply with applicable standards of the Underwriter's Laboratories, Inc.

1.04 SUBMITTALS

A. Manufacturer's product data and materials. Include technical specification information, photometric data, fixture efficiency, ballasts information, lamp information, weights, accessories, etc. In addition for occupancy sensors, submit performance specifications, coverage patterns, and load restrictions.

B. Shop Drawings: For the Acuity, submit a complete set of shop drawings showing all of the low voltage system components and wiring including sensors, switches, controllers, etc. Include system low voltage wiring. Confirm specific device types/models, such as sensors to be used, such as sensors, and provide recommendation. Note where the recommended device conflicts with the design documents for the engineer’s review.

C. Submit per Section 26 00 00.

D. As-builts drawings, product information, and O&M Manuals shall be furnished upon completion of the project.

PART 2 - PRODUCTS

2.01 LED LUMINAIRES

A. Fixtures shall comply with the following:
   1. UL Listed.
   2. Minimum 5-year warranty.
   3. L70 or L80 performance at 50,000 hrs.
   4. Photometrics testing and delivered lumens tested in accordance with IESNA LM-79.
   5. Testing for LED life and maintenance shall be per IESNA LM-80.
   6. Exterior fixtures to be rated for wet locations, IP65 rated.

2.02 LUMINAIRES

A. Luminaires recessed in ceiling shall conform with UL Standards. Equip fluorescent luminaire with fixture yoke to prevent tees from spreading where applicable and install field fabricated fire protection box (open ends) constructed of 1-5/8" thick UL listed gypsum board.

B. Weatherproof fixtures shall have neoprene gaskets on fixture trim and door assemblies. Fixture shall be UL listed for wet locations.

C. Luminaire voltage indicated on the plans is for reference. Verify actual voltage required based on the branch circuit.

D. Housing shall be prefinished. Color to be selected by Engineer.

E. Verify fixture mounting to ceiling type. Fixture shall be compatible with the ceiling type.

2.03 EMERGENCY FIXTURES/BALLASTS

A. Emergency ballasts in fluorescent troffers shall be rated at 1100 lumens for 90 minutes, solid state, with NiCad batteries rated at 15 yrs., charger, automatic operation, UL listed. It shall be located in the ballast channel of the fixture. With test switch and indicator lights visible from below. Emergi-Lite FPS series, Bodine, or equal.

B. Emergency ballasts for compact fluorescent downlight fixtures shall be integral with the fixture, UL listed, 90 minutes rated light output, NiCad batteries, charger, solid state, with test switch and indicator light visible from below.

C. Emergency fixtures shall be UL listed, 12Vdc, metal housing, NiCad batteries rated 15 yrs., wattage rating at 1.5 hrs (minimum 36 Watts), automatic charger, 100% solid state, indicator lights, test switch, capable of remote operation.

D. The emergency ballast in a fixture that is used for egress lighting and energized only during an emergency shall not have thermal protection.

2.04 SENSORS, SWITCHES, CONTROLLERS

A. Products to be Acuity or equal.

B. The system shall be complete including but not limited to; occupancy sensors, photo-sensors, dimmer switches, automatic wall switches, plug-load controllers, room controllers, wiring, interfaces, etc. Include network controllers where applicable.
   1. Occupancy sensors to include ultrasonic, passive infrared (PIR), and dual-technology ultrasonic & PIR.
   2. Automatic wall switches to include 1-8 button switches, dimming switches, 5-button scene switch. Include remote control switches only where specifically indicated.
   3. Daylight sensors to include single-zone, multi-zone, closed loop, open loop, and dual loop. Daylight sensors are self-calibrating.
   4. Controllers to include dimming and non-dimming room controllers and plug-load controllers.
   5. Network components to include network bridge, manager, router, and switch.
   6. System shall be low voltage 24VDC, plug-n-go, digital, class-2, 24VDC, UL listed, FCC part-5 compliant, 5-yr warranty. Communication and power delivered via Cat-5e cables and RJ45 connectors. Star or daisy chain connections. Up to 1000 ft of cable for DLM local network, 150 ft allowance per communicating device. BACnet compatibility. RoHS compliant.

C. Wall Switches: Shall be capable of desktop detection of 300 sf and gross motion of 1000 sf; loads from 0 to 800 watts at 120 Volts, 0 to 1200 Watts at 277 Volts; 180 degrees coverage; zero crossing circuitry; no leakage current to load; selectable for auto-ON or manual-ON for each output relay/circuit.

D. PIR Sensors: Utilize Pulse Count Processing and Digital Signature Analysis; mixed signal ASIC from false triggering to RFI and EMI interference; multiple segmented Lodif fresnel lens in multi-layer configuration with internal grooves.

E. Ultrasonic Sensors: Utilize advanced signal processing to adjust detection threshold dynamically to compensate for constantly changing levels of activity and air flow in the space; crystal controlled at 25 kHz, 32 kHz, or 40 kHz with maximum +/-0.005% tolerance for reliable performance and to eliminate sensor cross talk.

F. Dual Technology: Shall utilize PIR and ultrasonic technologies. Both technologies to switch ON, either technology to remain ON.

G. All Sensors: Shall have readily accessible user adjustable settings for time delay and sensitivity; bypass manual override in event of failure; LED visual indication of detected motion; UL rated.

2.05 WIRING

A. Fixtures shall be wired with conductors having insulation suitable for the environmental conditions, current, voltage, and temperature to which the conductors are subjected.

B. 120/208 Volt Luminaire: 300 Volt, type AF, HFF, KFF, SFF, ZFF, or equal, beginning at separately mounted outlet box.

C. 277/480 Volt Luminaire: 600 Volt, type HFF, KFF, PFF, ZF, ZFF, or equal, beginning at separately mounted outlet box.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Refer to reflected ceiling drawings; coordinate therewith for ceiling fixture installations throughout building. Luminaires shall be adequately mounted, wired, tested and left in an operating condition, complete with lamps, wattage as shown.

B. All dirt, plaster, paint, etc., on luminaires and lenses shall be removed before work will be accepted. Mounting of luminaires shall be in strict accordance the CEC Section 410.

C. Report changes in outlet locations of luminaires found necessary due to interference with structure, pipes, ducts, etc., to Architect for approval before installation. Luminaires specified with overall lengths are subject to change. Check job conditions; adjust as directed.

D. Install recessed luminaires with separate junction box, flexible conduit and heat resisting wire as required by CEC. Set junction box in furred space facing luminaire for maximum accessibility. Furnish and install metal ceiling frame so luminaire can be removed without damaging finish.

E. In wire suspended lay-in grid ceilings, all fixtures shall be positively attached to the ceiling suspension system by mechanical means, with screws or approved fasteners. Positively attached each end of the fixture against the T-bar runner with (2) #8 screws, or other method approved by the AHJ. In addition:
   1. Light fixtures weighing 10 lbs or less shall have a minimum of (1) #12 gauge slack safety wire connected to the fixture housing and the structure above.
   2. Light fixtures weighing greater than 10 lbs and 56 lbs or less may be supported directly on the ceiling runners, but they shall have a minimum of (2) #12 gage

slack safety wires attached to the fixture housing at diagonal corners and attached to the structure above.

3. Light fixtures weighing greater than 56 lbs shall be independently supported by not less than (4) taut #12 gage wires attached to the fixture housing and structure above.
4. All 4 ft. x 4 ft. fixtures shall be supported the same as the fixtures weighing more than 56 lbs.

F. Recessed light fixtures installed in a rated ceiling shall have a rated enclosure, around the light fixture equal to the ceiling rating. The enclosure shall be of the same material as the ceiling and shall maintain a 3" clearance from the light fixture.

G. Insulation shall not be installed above a recessed fixture or within 3" from the fixture, unless the fixture is rated for direct contact with the insulation (Type-IC).

3.02 ACCEPTANCE TESTING, CERTIFICATION, AND COMMISSIONING

A. Provide acceptance testing and commissioning in accordance with Title-24 California Energy Commission Building Energy Efficiency Standards. After system installation, provide testing and commissioning by the manufacturer's factory authorized technician to verify proper system adjustments, systems settings, systems testing, sensor placements, and train owner's personnel for adjustment and maintenance. Testing shall include (subject to systems installed):
1. Occupancy Sensors.
2. Manual controls and switching, including multi-level controls.
3. Manual Daylighting Controls.
4. Automatic Daylighting Controls.
5. Automatic Time Switch Controls.
6. Demand Response Controls.

B. Complete and submit the applicable Certificates of Installation and the Certificates of Acceptance. The certificates include (depending on the systems installed):
1. NRCI-LTI-01-E, Indoor Lighting
2. NRCI-LTI-02-E, Energy Management Control System or Lighting Control System
3. NRCI-LTI-03-E, Certified line-voltage track lighting integral current limiter, and supplementary overcurrent protection panel
4. NRCI-LTI-04-E, Two Interlocked Lighting Systems
5. NRCI-LTI-05-E, Power Adjustment Factor (PAF)
6. NRCI-LTI-06-E, Additional wattage installed in a video conferencing studio
7. NRCA-LTI-02-A, Lighting Control Acceptance
8. NRCA-LTI-03-A, Automatic Daylight Control Acceptance
9. NRCI-LTO-01-E, Certificate of Installation; Outdoor Lighting
10. NRCI-LTO-02-E, Certificate of Installation; Energy Management Control System or Lighting Control System
11. NRCA-LTO-02-A, Certificate of Acceptance, Outdoor Lighting Controls

3.03 WARRANTY

A. All materials and installation shall be provided with a 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.
   1. Occupancy sensors & automatic wall switches to have a 5-year warranty.

END OF SECTION

SECTION 27 05 50 - INSTALLATION AND IDENTIFICATION OF SIGNAL CABLES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The installation and identification of Signal cables. Signal cables as referenced in this section shall include but not limited to cables for the following systems; intercom, paging, clock, telephone, speaker, fire alarm, intrusion, television/video, and sound/audio.

1.02 RELATED SECTIONS

A. Sections where signal cables are specified. Such systems are specified in the Divisions 27 and 28.

1.03 SUBMITTALS

A. Submit cables and method of labeling including tags, ties, labels, etc.

B. Submit per Section 26 00 00.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. Refer to cables and wires specified under other sections.

B. All energy limited cables that are identified as opened wired (not in conduit) within buildings shall be rated for the environment it is installed. Exposed wiring shall not be used in hazardous locations and locations not allowed by the CEC.
   1. General Purpose rating allows the cable to be used in areas allowed by the CEC but shall not be used as riser cable and in air plenums.
   2. A Riser rating allows the cable to be used in general purpose applications and building riser applications. Riser cables shall not be used in air plenums.
   3. A Plenum rating allows the cable to be used in general purpose, riser, and air plenum applications.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all wiring in accordance with manufacturer's recommendations. All work shall be performed in a neat and workmanlike manner. All debris, trash, leftover materials etc., shall be cleaned out of pull boxes, terminal cabinets, terminal rooms and the general work areas.

B. Cables shall be labeled at each terminal location and at pull boxes.

C. Protection of Cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T & B "Ty-Rap" cable. Edge protection material ("cat-track") shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

D. Cable Identification:Individual conductors not in a multiconductor cable and multiconductor cables shall be color coded and/or individually identified. Each cable identification shall be a unique number located approximately 1-1/2" from cable connection at both ends of cable. Numbers shall be approximately 1/4" in height. A typewritten schedule shall be provided at each cabinet or terminal location indicating the destination of the cable from such location. Example, an intercom cable entering and terminating in Building-A from Building-B shall be labeled at Building-A as follows, "INTERCOM FROM BLDG-B". A schedule shall be provided for each system cables. The schedule shall be on an 8.5" x 11" plain paper identifying all cables of the system at the terminal location, and shall be typewritten, neatly handwritten are allowed only when approved. A copy of the schedule shall located at the terminal location and a copy shall be provided to the Owner. The schedule shall match the identification on the As-Built drawings.

E. At pull boxes, use engraved plastic tags minimum of 2"H X 4"W securely tied around cable. Tags shall be listed for such use and shall not corrode or be susceptible to such environments. All cables shall be labeled by system type and destination, to and from.

F. Shielding: Cable shielding shall be connected to common ground at point of lowest audio level and shall be free from ground at any other point. Shields shall be connected a one end only to prevent ground loops. Cable shields shall be terminated in same manner as conductors.

G. Nameplates: Terminal cabinets and junction boxes shall have plastic engraved nameplates to identify each with Drawings and Specifications. Refer to Section 26 00 00.Provide nameplates at backboard terminals for each system, sample "INTERCOM". Secure all labels with screws.

H. Outlet Box Identification: All outlet boxes mounted in attic space shall be individually identified with a black permanent waterproof marker. Identification shall be by system type and/or cable type.

I. All cables shall be run in continuous lengths between terminal locations and/or equipment, no splicing permitted.

J. The Contractor shall supply and install all modular mushroom rings, D-rings, etc., needed for the terminal boards. The blocks should allow for a minimum of 25% growth.

K. Cables on backboards shall be neatly trained following the lines of the room/backboard. Typically routes shall be vertical and horizontal with smooth turns. Do not route cables in odd angles.

L. Provide grounding electrode conductor, #6 AWG bare stranded copper. Locate at each terminal location and bond to building grounding electrode system. At backboards, provide a minimum 3"H X 6"W copper ground buss with stand-offs, secure to backboard. At each terminal cabinet, terminate ground wire in ground lug. One ground conductor may serve multiple backboards and terminal cabinets in the same area.

M. Terminations shall be consistent as to the color of conductors throughout the system at like stations.

N. The system shall be checked by the Contractor for opens, grounds, and shorts.

END OF SECTION

SECTION 27 05 53 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Color and legend requirements for labels and signs.
   2. Labels.
   3. Bands and tubes.
   4. Tapes.
   5. Signs.
   6. Cable ties.
   7. Fasteners for labels and signs.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for communications identification products.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70 and TIA 606-B.

B. Comply with ANSI Z535.4 for safety signs and labels.

C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Equipment Identification Labels:
   1. Black letters on a white field.

2.03 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
   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. Brady Corporation.
      b. Champion America.
      c. emedco.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.
   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. Brady Corporation.
      b. HellermannTyton.
      c. Marking Services, Inc.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, polyester flexible labels with acrylic pressure-sensitive adhesive.
   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. A'n D Cable Products.
      b. Brady Corporation.
      c. Brother International Corporation.
   2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating protective shields over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
   3. Marker for Labels: Permanent, waterproof black ink marker recommended by tag manufacturer.
   4. Marker for Labels: Machine-printed, permanent, waterproof black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
   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. A'n D Cable Products.

b. Brady Corporation.
c. Brother International Corporation.

2. Minimum Nominal Size:
   a. 1-1/2 by 6 inches for raceway and conductors.
   b. 3-1/2 by 5 inches for equipment.
   c. As required by authorities having jurisdiction.

2.04 BANDS AND TUBES

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.
   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. Brady Corporation.
      b. HellermannTyton.
      c. Marking Services, Inc.
      d. Panduit Corp.

2.05 UNDERGROUND-LINE WARNING TAPE

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. Brady Corporation.
   2. Ideal Industries, Inc.
   3. LEM Products Inc.

B. Tape:
   1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground communications utility lines.
   2. Printing on tape shall be permanent and shall not be damaged by burial operations.
   3. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

C. Color and Printing:
   1. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, and ANSI Z535.4.
   2. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL-FIBER CABLE.

D. Tag: Type I:

1. Pigmented polyolefin, bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Width: 3 inches.
3. Thickness: 4 mils.
4. Weight: 18.5 lb/1000 sq. ft.
5. Tensile according to ASTM D 882: 30 lbf and 2500 psi.

2.06 SIGNS

A. Baked-Enamel Signs:
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. Carlton Industries, LP.
   b. Champion America.
   c. emedco.
2. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:
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. Brady Corporation.
   b. Champion America.
   c. emedco.
   d. Marking Services, Inc.
2. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 10 by 14 inches.

C. Laminated-Acrylic or Melamine-Plastic Signs:
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. Brady Corporation.
   b. Carlton Industries, LP.
   c. emedco.
   d. Marking Services, Inc.
2. Engraved legend.
3. Thickness:

a. For signs up to 20 sq. in., minimum 1/16 inch thick.
b. For signs larger than 20 sq. in., 1/8 inch thick.
c. Engraved legend with black letters on white face.
d. Self-adhesive.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.07 CABLE TIES

A. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F according to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.08 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 PREPARATION

A. Self-Adhesive Identification Products: Before applying communications identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of communications systems and connected items.

G. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

H. Vinyl Wraparound Labels:
   1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
   2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
   3. Provide label 6 inches from cable end.

I. Snap-Around Labels:
   1. Secure tight to surface at a location with high visibility and accessibility.
   2. Provide label 6 inches from cable end.

J. Self-Adhesive Wraparound Labels:
   1. Secure tight to surface at a location with high visibility and accessibility.
   2. Provide label 6 inches from cable end.

K. Self-Adhesive Labels:
   1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
   2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

L. Snap-Around, Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

M. Underground-Line Warning Tape:
   1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [or concrete envelope]exceeds 16 inches overall.
   2. Limit use of underground-line warning tape to direct-buried cables.
   3. Install underground-line warning tape for direct-buried cables and cables in raceways.

N. Cable Ties: General purpose, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.03 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations with high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify covers of each junction and pull box with self-adhesive labels containing wiring system legend.
1. System legends shall be as follows:
   a. Telecommunications.
   b. <Insert name>.

D. Faceplates: Label individual faceplates with self-adhesive labels. Place label at top of faceplate. Each faceplate shall be labeled with its individual, sequential designation[, numbered clockwise when entering room from primary egress], composed of the following, in the order listed:
1. Wiring closet designation.
2. Colon.
3. Faceplate number.

E. Equipment Room Labeling:
1. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels containing equipment designation.
2. Patch Panels: Label individual rows and outlets, starting at to left and working down, with self-adhesive labels.
3. Data Outlets: Label each outlet with a self-adhesive label indicating the following, in the order listed:
   a. Room number being served.
   b. Colon.
   c. Faceplate number.

F. Backbone Cables: Label each cable with a self-adhesive wraparound label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.

G. Horizontal Cables: Label each cable with a self-adhesive wraparound label indicating the following, in the order listed:
1. Room number.
2. Colon.

3. Faceplate number.

H. Locations of Underground Lines: Underground-line warning tape for copper, coaxial, hybrid copper/fiber, and optical-fiber cable.

I. Instructional Signs: Self-adhesive labels.

J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Baked-enamel warning signs.
1. Apply to exterior of door, cover, or other access.

K. Equipment Identification Labels:
1. Indoor Equipment: Laminated-acrylic or melamine-plastic sign.
2. Outdoor Equipment: Laminated-acrylic or melamine-plastic sign.
3. Equipment to Be Labeled:
a. Communications cabinets.
b. Uninterruptible power supplies.
c. Computer room air conditioners.
d. Fire-alarm and suppression equipment.
e. Egress points.
f. Power distribution components.

END OF SECTION

SECTION 27 13 10 - TELEPHONE CABLING SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install a complete Telephone Cabling System including all wiring, connectors, jacks, terminal blocks, backboards, cabinets, harnesses, etc. including any incidental equipment for a complete system.

1.02 RELATED DOCUMENTS AND SECTIONS

A. Underwriters Laboratories Specifications, UL13 and UL444.

B. California Electrical Code (CEC) Articles 725 and 800.

C. Electronic Industries Association/Telecommunications Industry Association (ETA/TIA) Document #TSB-36 and 40, and EIA/TIA-568 and 569.

D. Section 26 00 00, 26 05 00, 27 05 50.

E. Division 01.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of telephone communications system cables and components and whose products have been in satisfactory use in similar service for not less than five years.

B. Installer's Qualifications: Firms regularly engaged in installation of telephone communications system cables and components.

1.04 SUBMITTALS

A. Submit shop drawings and product data for each item, including the following:
   1. Complete wiring diagram including wire sizes, point-by-points, etc.
   2. Show outlet numbering for all station cabling.
   3. All drawings shall be neat and legible.
   4. Submit complete product data including cut sheet and specification sheet.

B. As-built drawings and O&M Manuals shall be furnished upon completion of the project.

PART 2 - PRODUCTS

2.01 CABLING SYSTEM

A. Cable, connectors, blocks, wall mounted hardware, etc. shall be manufactured by Lucent Technologies or equal.
   1. All telephone system cabling shall be unshielded twisted pair.
   2. The horizontal cable shall be 4-pair Category 6e UTP and shall meet EIA/TIA Commercial Building Telecommunications Wiring Standards for horizontal wire.
   3. The station cable will terminate on 110A wall mounted hardware, with legs.
   4. The twists and the outer jacket of all cables shall be maintained within one inch (1") of the termination point.
   5. Provide a RJ45 type Category 6e eight pin modular jack (M1BH) at the station end of all 4 pair cables. All jacks will use the EIA/TIA - 568B wiring configuration.
   6. Twisted Pair Entrance and Distribution Cable: All twisted pair entrance cables shall be Category-6e, 22 gauge, twisted pairs. They shall comply with UL and CEC Article 800 requirements. Indoor cable shall be rated for the environment, CM for non plenum/riser areas and CMP for riser and plenum areas. Outdoor cable shall be suitable for direct burial, OSP type.
   7. Terminate Entrance and Distribution cables on 110 blocks with legs. Provide cross connect to station cable blocks.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Technicians and workman employed on this project shall be particularly skilled in this type of work. Workmanship on installed systems shall be of professional quality, best commercial practice.

B. Furnish and install all required interfaces, wiring, and components to other systems and or devices requiring telephone system interface or service.

C. Install all backboards, racks, etc. necessary to complete full installation.

D. Test and label all new copper wiring. Testing for copper cables must include at a minimum, continuity, shorts, crosses, and grounds. Labeling shall be identified by location and room numbers as furnished by District. Prior to performing final labeling, labeling information shall be coordinated with District.

E. Labeling of all terminations must be done professionally, based on a client approved method.

F. All jelly filled cables shall be plugged to prevent jelly seepage.

G. Provide terminal boards and cross connect blocks as required.

H. Provide plywood backboard as shown on the drawings.

I. The Contractor shall supply and install all modular backboards blocks, modular mushroom boards, D-rings etc., needed for the terminal boards. The blocks should allow for a minimum of 50% growth.

J. Station cables shall be terminated on separate blocks and neatly marked with cable numbers.

K. Blocks shall be installed top to bottom and left to right.

3.02 GROUNDING

A. Provide equipment grounding conductor, #6AWG bare stranded copper in 1/2" conduit to the Building's main grounding electrode or bus. Locate at each terminal board and bond to building grounding electrode system. Provide 10 feet of slack wire coiled at terminal board.

3.03 CONDUIT SEPARATION

A. Separate the telephone conduits from electric light or power conduit by not less than 6-inches.

3.04 CONSTRUCTION MEETINGS

A. As a minimum the Contractor shall schedule construction meetings at the jobsite as follows:
   1. Prewire meeting shall occur after raceways are installed and prior to pulling of any wire or cable.
   2. Pre-termination meeting shall occur after wire and cable has been installed and prior to termination.

B. Meetings shall include the Project Inspector, Schools Representative, the electrical subcontractor, and the Telephone System Contractor as a minimum.

3.05 TESTS

A. After all equipment specified herein has been installed and is in operating condition, performance tests shall be conducted to determine that installation and components comply with these specifications. Contractor shall furnish competent personnel for these tests.

B. Testing shall be scheduled with the District and shall occur before occupancy occurs.

3.06 WARRANTY

A. The Telephone System shall be warranted by the Contractor for a period of not less than one (1) year after acceptance of the installation. During the warranty period, any material showing any mechanical, or electrical defects shall be replaced promptly by the Contractor at no expense to the Owner.

END OF SECTION

SECTION 27 13 20 - DATA COMMUNICATIONS SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish and install a complete data communications system. The system shall consist of but not limited to cables (twisted-pair copper), innerduct, patch panels, fiber interconnect equipment, connectors (fiber and copper), wiring blocks and telecommunications outlets and any other equipment and accessories as required. The work performed under this specification shall be of good quality and performed in a workmanlike manner. In this context "good quality" means the work shall meet industry technical standards and quality of appearance. The Owner reserves the right to reject all or a portion of the work performed, either on technical or aesthetic grounds. All materials to comply with school district standards.

B. The copper cabling system shall perform to Category-6e, 6A Permanent Link performance requirements, from patch panel to outlet jack. The system shall be capable for transmission of the Gigabit Ethernet (1000Base-T) protocol and other designed for Category-6e, 6A cabling systems.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to work specified in this Section.

B. Sections 26 00 00, 26 05 00, 27 05 50.

C. Applicable Standards:
1. ANSI/TIA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces.
2. ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Cabling Standard.
3. ANSI/TIA/EIA-568-B.2, Transmission Performance Specifications for 4-Pair 100 Ohm Category 6e, 6A Cabling.
4. TIA/EIA-606-A (2002), Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
5. J-STND-607-A (2002), Commercial Building Grounding and Bonding Requirements for Telecommunications.
6. EIA/TIA-455-61, FOTP-61, Measurement of Fiber or Cable Attenuation Using an OTDR.
7. IEEE 802.3, Carrier Sense Multiple Access With Collision Detection.

8. CEC Articles 770 and 800.

1.03 CONTRACTOR QUALIFICATIONS

A. In order to qualify for installation of the data communications system, Contractor must possess the required license classification, a performance history, experience in the installation and termination of fiber optics cable systems, certification from cabling manufacturer, and proof of time in business.
   1. License Classification: Contractor must possess a valid C-7 California State Contractor's License. This license must have been issued two years prior to the date of this bid. No other license classification is acceptable.
   2. Performance History: Contractor must have successfully performed at least three projects of similar scope, within two years of the date of this bid. Proof of performance shall be in the form of reference sheets which shall include a brief description of the project, the beginning and ending contract price, the project foreman or superintendent's name, and the name, address, and telephone number of a project contact.
   3. Fiber Optics Experience: Contractor must be able to prove to the satisfaction of Owner that it has significant experience in the installation of fiber optics cable systems. Installation must include installation of fiber optics cable, fiber termination, a knowledge of interconnect equipment, and a thorough knowledge of testing procedures. Contractor must provide a minimum of 3 references supporting its claim of experience for similar projects within the 2 years prior to this bid. Documentation must be included with the bid documents submitted.
   4. Certification from Cabling Manufacturer: Contractor must be able to prove to the satisfaction of the Owner via a certificate that certification in copper and fiber optic product installation has been granted and is current.
   5. Time in Business: Contractor must have been in business and in the business of installing telecommunications systems, continuously, for a period of at least three years, prior to the date of this bid. Contractor must submit at least one project reference for each of the three years prior to the date of this bid. These project references shall contain the same information required in Paragraph B above. Contractor must also provide a list of key installation personnel, their hire dates, and a resume of their experience. Key installation personnel shall include at least one foreman and two journey level installers or technicians. By submitting the names of these personnel, Contractor is committing them to the execution of the project outlined in this specification.

1.04 DEFINITIONS

A. Main Distribution Facility (MDF): The MDF is the location, within a building or complex of buildings, where the entire telecommunications system originates. It may include: The physical location, enclosure, wire and cable management hardware, termination hardware, distribution hardware, and equipment racks. ANSI/TIA/EIA-569-A refers to the room housing the MDF as the "Equipment Room".

B. Intermediate Distribution Facility (IDF): The IDF is the location in a building where a transition between the backbone or vertical riser system and the horizontal distribution system occurs. It may include: The physical location, enclosure, wire and cable management hardware, termination hardware, distribution hardware, and equipment racks. The IDFs provide the interface location between fiber distribution cable (backbone) and station cable (horizontal distribution).

C. Backbone Pathway: The Backbone Pathway consists of a series of conduits or chases which connect the MDF to IDFs or IDFs to IDFs. It generally houses the vertical or backbone system.

D. Backboard: Backboard generally refers to the plywood sheeting lining the walls of telecommunications facilities. Backboard may also refer to the entire wall-mounted assembly, including wire management, wiring blocks, and equipment racks. In this case, the term Backboard is fully interchangeable with SBB or TTB and the equipment required to fulfill the Scope of Work below.

1.05 SYSTEM DESCRIPTION

A. The data communications system shall consist of active hub equipment, a fiber optics backbone and twisted pair copper work station cabling. The central location shall house an MDF and each of the other locations shall house an IDF. Each fiber optics cable shall originate in the MDF and shall be terminated in its respective IDF. All fiber optic cables shall be enclosed in innerduct which shall be routed through a system of conduits and raceways. From each IDF one or more twisted-pair copper cables shall be routed to each data outlet location. These cables shall originate in an IDF and terminate in its respective data outlet location. The MDF and each IDF will house active data distribution equipment including but not limited to fiber hubs, data terminal controllers, local area network hubs, fiber optic transceivers, routers, and DSU/CSU devices. Unless specifically noted, active equipment is not within the scope of the work.

1.06 MANUFACTURER

A. Throughout this specification, manufacturers are cited, along with specific part numbers. These citations are for the purpose of establishing quality and performance criteria.

1.07 SUBMITTALS AND SUBSTITUTIONS

A. The submission shall consist of five (5) major sections with each section separated with insertable index tabs. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect. Each page in the submission shall be numbered chronologically and shall be summarized in the index. The second section shall include a copy of the Contractor's valid C-7 California State Contractor's License, the information required in Section 1.2

above, and a list of instrumentation to be used for system testing. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment in the specifications. The fourth section shall contain samples of proposed cable markers and labeling. The fifth section shall contain a complete, detailed satellite closet count, workstation, count, and bill-of-materials. Any Contractor failing to include all of the required information shall be deemed non responsive and may be disqualified, at the discretion of the Owner.

B. For purposes of determining equality, technical and general information set forth on the respective data sheets by manufacturers named for each specified item shall be considered as part of these specifications and binding herein. Any proposed equal item offered shall be substantiated fully to prove equality. The Owner reserves the right to require a complete sample of any proposed equal item and may, if necessary, request a sample tested by and a copy of the test results by an independent testing laboratory to prove equality. The decision of the Owner regarding equality of proposed equal items will be final.

1.08 FUNCTION AND OPERATION

A. The intended function of the data communications cable system is to transmit data signals from a central location to several individual data outlet locations.

B. The multimode fiber optics cable system shall be capable of transmitting signals with a bandwidth per the performance parameters of the specified cable. The cumulative signal loss, through connectors, jumpers, couplers, and fiber cable, shall be no more than the manufacturer's stated dB loss based on cable length and 0.6 dB loss for each connector assembly.

C. Work station cable, commencing at the wiring blocks, shall be installed in accordance with ANSI/TIA/EIA-568-B.1 standard and shall be capable of transmitting a signal at 155 MBPS with acceptable performance in accordance with Category-6A, 6e performance requirements as specified in ANSI/TIA/EIA-568-B.2-1. The entire work station cable system, including wiring blocks, cable, and telecommunications outlets shall be tested for Category-6 compliance.

PART 2 - PRODUCT AND INSTALLATION

2.01 GENERAL

A. Equipment shall be installed in accordance with the drawings and the manufacturer's requirements. General installation provisions are as follows:
   1. Wiring Blocks and Wire Management Components: Where required, wiring blocks and wire management components shall be mounted to the plywood backboard. Each device shall be mounted such that its horizontal dimension is

level. In cases where more than one device is mounted, they shall be aligned vertically. Each device shall be affixed to the plywood backboard by means of screws suitable for fastening to plywood. A minimum of four (4) of the mounting holes provided shall be utilized for fastening.

2. Copper Cable: Where copper cable enters an IDF it shall be affixed to the backboard via "D" Rings and cable ties in accordance with the attached drawings. All cable shall be neatly bundled, combed, and tied. All cable runs, within the IDF shall be horizontal or vertical within the constraints of minimum cable bending radii.
3. Labeling: With exception of work station cables, hand written labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or type written onto adhesive labels. The font shall be at least one-eighth inch (1/8") in height, block characters, and legible. The text shall be of a color contrasting with the label such that it may be easily read. If labeling tape is utilized, the font color shall contrast with the background. Patch panels shall exhibit workstation numbers, in sequential order, for all workstations served by the IDF.
    a. Each telecommunications outlet shall be labeled with its respective work station number (machine labels only). Workstation numbers shall be comprised of the Building Designator-The Room Number-The Station Number (for example A-205-2). Each workstation cable shall be neatly hand labeled, using permanent ink or other permanent labeling medium, at each end with its respective workstation number. Each copper backbone cable shall be machine labeled at each end with its respective IDF number. Each binder group shall be tied off with its respective identifying ribbon at each break-out point.
    b. For device floor boxes, the label shall be inside the box either on the back of the lid cover or adjacent to the device.

2.02 WORK STATION CABLE & JACKS

A. Description: From each IDF and MDF, provide data cable(s) to each work station (data/VOIP outlets) served.
1. Product: 4 pair #24 or #23 UTP, Category-6e (data), 6A (WAP, CCTV), PVC jacket, third party verified to ANSI/TIA/EIA-568-B. Cables routed between floors or in air plenums shall be CMP plenum rated with same performance parameters. Shall be able to support 100/1000 MBPS TP-PMD/CDDI, 155 bps ATM. SYSTIMAX, Leviton, Ortronics and Panduit Guaranteed performance at 250 MHz:
    a. Attenuation = 32.8 dB max.
    b. NEXT = 38.3 dB min.
    c. ACR = 5.5 dB min.
    d. PS NEXT = 36.3 dB min.
    e. PS ACR = 3.5 dB min.
    f. ELFEXT = 20.8 dB min.

g. PS ELFEXT = 17.8 dB min.
h. Return Loss = 17.3 dB min.

2. Required Accessories and Quantities (Hard Wall Locations):
   a. Wall Plate: Single gang and multi-gang, with designation windows, with blank fillers.
   b. Category-6e, 6A Jacks.
   c. Miscellaneous: Provide appropriate modules with appropriate connectors for other system devices.
3. At other than wall installations (i.e., raceways, floor boxes, etc.) provide Category-6e, 6A jacks to fit application.

B. Installation: Installation shall be conducted in accordance with guidelines established by the product manufacturer and industry standards. Wall plates shall be mounted such that their vertical dimension is plumb. Each wall plate shall be labeled with its respective work station number. Each modular mounting frame shall be labeled with its respective work station number.

2.03 MAIN DISTRIBUTION FACILITIES (MDF)

A. Description: Existing MDF cabinet.
1. Products and Quantities:
   a. Modular Patch Panels: Rack mounted. Up to 24 ports per rack space (1.75"), T568B configuration, in 12 or 24 port increments. One (1) port for each workstation served with a minimum of 12 spare ports is required. Minimum (1) 24 port patch panel. Provide as many patch panels as necessary to service all workstation cables plus the required spare count. CPI, Cooper/B-Line and Panduit.
   b. Wiring Blocks.
2. Required Accessories and Quantities:
   a. Wire Management: One set for each patch panel.
   b. "D" Rings: Provide and install sufficient quantities of 2" and 3" "D" rings, at 12 inches on center on wall/backboard.
   c. Modular patch cords. Length as required.

B. Installation: Installation shall be conducted in accordance with manufacturer's recommendations, industry standards, and this specification. Installation includes complete assembly and mounting of the fiber interconnect equipment, dressing the fiber and copper cables, complete assembly and mounting of the equipment rack, ground bus bar (grounded to nearest grounding system) and mounting of the wiring blocks.

2.04 TESTING AND DOCUMENTATION

A. Testing: Contractor shall test each pair of twisted-pair copper cable. The Owner reserves the right to have a representative present during all or a portion of the testing

process. If the Owner elects to be present during testing, test results will only be acceptable when conducted in the presence of the Owner.

1. Workstation Cable: Each workstation cable shall be tested from the Jack Panel to the data outlet to ANSI/TIA/EIA-568-B.2-1 Category-6e, 6A performance standards.
    a. Test Equipment: HP Wirescope 350, Microtest Omniscanner-2 or equivalent. Must meet level III compliance in accordance with ANSI/TIA/EIA-568-B.
    b. Tests: Signal Attenuation, Noise, Near End Cross-talk (NEXT), ELFEXT, Power sum NEXT, ACR, Return Loss, Cable Length, Propagation Delay and Delay Skew.
    c. Test Criteria: The system shall be tested to Category-6e, 6A compliance. The test path shall include workstation jacks, station cables, and jack panels (Permanent Link Configuration). Where adapter (patch) cables are specified, the tests shall include the patch cables also (Channel Configuration). The owner reserves the right to have cables replaced and retested if performance parameters are not met.

B. Documentation: Contractor shall provide documentation to include test results and as-built drawings.
    1. Work Station Cable: The results of the work station cable tests shall be provided in the form of print-outs from the test equipment.
    2. As-Built Drawings: Provide reproducible vellum as-builts, full size indicating each outlet location and designation. Show IDF/MDF locations and cable designations terminated.

2.05 ACCEPTANCE

A. Acceptance of the Data Communications System, by Owner, shall be based on the results of testing, functionality, and the receipt of documentation. With regard to testing, all fiber segments and all workstation data cables must meet the criteria established. With regard to functionality, Contractor must demonstrate to Owner that specified data signals can be successfully transmitted, bi-directionally, from the MDF/IDF to and from some number of individual data outlets. The number of outlet locations to be tested shall be determined by Owner. With regard to documentation, all required documentation shall be submitted to Owner.

PART 3 - EXECUTION

3.01 DIVISION OF WORK

A. Contractor shall install the data communications system as described in the preceding. Installation shall result in a functional system. The Scope of Work includes:
    1. All necessary conduit and raceway.

2. Necessary trenching, backfill, replacement of landscape material, repair of damage to utilities or structures, replacement of asphalt and base, and replacement or repair to concrete flat work incidental to conduit or raceway installation.
3. Provide and install all equipment.
4. Supply and install all material discussed in this specification.
5. Test and document system, upon completion.
6. Supply and install all material necessary, whether or not discussed in this specification, to result in a complete and functional system.

END OF SECTION

SECTION 27 52 00 - ASSISTIVE LISTENING SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Provide an installed FM Assistive Listening System in the assembly spaces.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Due to the nature of the project, this section may relate directly to, or requires coordination with all sections of the Contract Documents. Special attention should be given to:
   1. Section–Electrical General Requirements

1.03 QUALITY ASSURANCE:

A. All materials shall comply with applicable standards of the Underwriters Laboratories Inc.

1.04 CONTRACTOR SUBMITTALS:

A. Shop drawings and catalog data submittals shall be made in accordance with Section, "Contractor Submittals." Submit sufficient information to indicate the scope and quality of the Assistive Listening System.
   1. Block diagram showing system relationships of major components and quantities and interconnecting cable requirements.
   2. Plans showing equipment location and conductor requirements.
   3. Equipment outlet devices and special mounting details.
   4. Wiring diagrams showing terminal identification for field-installed wiring.
   5. Catalog literature with component specifications.

1.05 DESCRIPTION:

A. Work under this section includes all equipment, labor, and materials necessary to furnish and install a complete assistive listening system.

B. The assistive listening systems shall be a Frequency Modulated Radio Transmission system.

C. The portable system shall utilize a belt pack transmitter with headset microphone.

D. The ALS systems shall be capable of operating over 3 separate channels simultaneously.

E. Receivers shall be provided at a rate of 4% of the total seating capacity of each room. Refer to architectural drawings for maximum room capacity. Quantity shall be as indicated on drawings.

F. Features:
1. Multi Purpose-No seating restrictions, 1,500 ft system range
2. Receivers are pre-tuned, users control their own volume
3. Easily expanded no limit to number of users.
4. Excellent sound quality, free from interference
5. Automatic Gain Control
6. Frequency Synthesized, phase locked loop tuning
7. Can accept either balanced or unbalanced inputs
8. Input attenuation and low frequency attenuation switches
9. LED power and audio level indicators

PART 2 - PRODUCTS

2.01 GENERAL:

A. All equipment shall be the standard catalogued products of a single manufacturer. The catalog numbers of the following equipment are Listen Technologies:

B. Portable Transmitter
1. The portable FM transmitter shall be capable of broadcasting on 17 channels and be frequency agile.
2. The transmitter shall have a SNR of 80 dB or greater.
3. The transmitter shall operate at 072 MHz
4. The Listen LT-800-0072 is specified:
   a. LA-278 Behind-the-Head Microphone
   b. LA-362 NiMH rechargeable batteries.
   c. LA-122 Universal Antenna Kit
   d. LA-326 Universal Rack Mounting Kit

C. Portable Receiver
1. The FM receiver shall be capable of receiving on 17 wide band channels with a SNR of 80dB or greater.
   a. The device shall be able to be locked on a single channel.
   b. The receiver shall be capable of seeking channels.
   c. The device shall have an adjustable squelch.
   d. The device shall have an audio frequency response of 50 Hz to 15 KHz, ±3 dB.
   e. The device will incorporate a stereo headset jack that allows the user to plug in either a mono or stereo headset.

f. The device shall incorporate an LCD display that indicates channel, battery level, low battery, battery charging, and RF signal strength.
g. The receiver shall be able to function in both DX and Local mode.
h. The unit shall operate off of 2 AA batteries. The receiver shall incorporate automatic battery charging circuitry for recharging of NiMH batteries.
i. The Listen LR-300-0072 is specified.

2. The FM receivers shall be recharged using a charging carrying case for up to 8 units.
   a. Unit Charging Case – The Listen LA-323, LA-324, LA-325, LA-317-01 is Specified
      1) Quantity as required for each unit.
3. The FM receivers shall each be equipped with Ear Speakers.
   a. LA-164 is specified.
   b. LA-166 Neck Loop
      1) Quantity as required for each unit.
4. Receivers shall be equipped with NiMH rechargeable batteries.
   a. The Listen LA-362 is specified.
   b. Quantity as required for each unit.

D. Provide sound reinforcement wall plaques per ADA requirements to indicate equipment available for the hearing impaired.
   1. Verify location with general contractor prior to installation. Use the “international symbol of access for the hearing impaired”.
   2. Listen Technologies LA-304 ADA Access/Compliance signage kit.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The contractor shall supply all equipment required to provide a complete and functional assistive listening system.

B. The assisted listening system shall be an integral part of the sound reinforcement system for the required spaces.

3.02 TESTS AND ADJUSTMENTS

A. Under completion of the installation of all equipment and when same is in full operating condition, the contractor shall perform the initial completion tests and adjustments specified hereinafter. The Contractor is responsible to provide all necessary instruments, equipment, material, and labor necessary to complete the tests.

3.03 TRAINING:

A. Prior to establishing a training schedule, contractor will verify operational status of system with owner's rep.

B. Owner personnel will be trained in the operation of the Assistive Listening System.

C. Training will be conducted no less than two times, four hours each. An initial familiarization and a follow up for detailed questions.

3.04 WARRANTY

A. The manufacturer shall guarantee the system and components to be free from defects of material and workmanship for a period of two years from the date of final acceptance by the owner.

END OF SECTION

SECTION 28 31 00 - FIRE ALARM DETECTION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, auxiliary control devices and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for Local Protected Premises Signaling Systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
   1. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 24 hours of backup power with the ability to sustain 15 minutes in alarm and evacuation at the end of the backup period.

C. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

D. The FACP and peripheral devices shall be manufactured or supplied 100% by a single U.S. manufacturer (or division thereof).

E. Underwriters Laboratories Inc. (UL) - USA:
   1. No. 38 Manually Actuated Signaling Boxes
   2. No. 50 Cabinets and Boxes
   3. No. 864 Control Units for Fire Protective Signaling Systems
   4. No. 268 Smoke Detectors for Fire Protective Signaling Systems
   5. No. 268A Smoke Detectors for Duct Applications
   6. No. 346 Waterflow Indicators for Fire Protective Signaling Systems
   7. No. 464 Audible Signaling Appliances
   8. No. 521 Heat Detectors for Fire Protective Signaling Systems
   9. No. 1971 Visual Notification Appliances

F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

1.02 SCOPE

A. A fire alarm detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance:
1. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B) as part of an addressable device connected by the SLC Circuit.
2. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y) as part of an addressable device connected by the SLC Circuit.
3. All circuits shall be power-limited, per UL864 requirements.
4. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
5. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

C. Basic System Functional Operation: When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
1. The system Alarm LED on the FACP shall flash.
2. A local sounder with the control panel shall sound.
3. A backlit 80-character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm. Additionally, the system shall send events to a central alarm supervising station via either dial-up over PSTN or Internet or Intranet via PSDN or virtual private network.

1.03 SUBMITTALS

A. General:
1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
   3. Show annunciator layout, configurations, and terminations.

C. Manuals:
   1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
   2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
   3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications:
   1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
   2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

1.04 GUARANTEE

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.05 MAINTENANCE

A. Maintenance and testing shall be on a semi-annual schedule or as required by the local AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The schedule shall include:
   1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, waterflow switches and all accessories of the fire alarm system.
   2. Each circuit in the fire alarm system shall be tested semiannually.

3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72 Chapter 10.

B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, tests, and repairs described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

1.06 POST CONTRACT EXPANSIONS

A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of intelligent or addressable devices by ten percent (10%). This quotation shall include intelligent smoke detectors, intelligent heat detectors, addressable manual stations, addressable beam detectors, addressable monitor modules and addressable control modules equal in number to one tenth of the number required to meet this specification (list actual quantity of each type).

C. The quotation shall include installation, test labor, and labor to reprogram the system for this 10% expansion. If additional FACP hardware is required, include the material and labor necessary to install this hardware.

1.07 APPLICABLE STANDARDS AND SPECIFICATIONS

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.
1. National Fire Protection Association (NFPA) - USA:
   a. No. 13 Sprinkler Systems
   b. No. 70 National Electric Code (NEC)
   c. No. 72 National Fire Alarm Code
   d. No. 101 Life Safety Code
   e. No. 38 Manually Actuated Signaling Boxes
   f. No. 217 Smoke Detectors, Single and Multiple Stations
   g. No. 228 Door Closers–Holders for Fire Protective Signaling Systems
   h. No. 268 Smoke Detectors for Fire Protective Signaling Systems
   i. No. 268A Smoke Detectors for Duct Applications
   j. No. 346 Waterflow Indicators for Fire Protective Signaling Systems
   k. No. 464 Audible Signaling Appliances
   l. No. 521 Heat Detectors for Fire Protective Signaling Systems

m. No. 864 Control Units for Fire Protective Signaling Systems
n. No. 1481 Power Supplies for Fire Protective Signaling Systems
o. No. 1610 Central Station Burglar Alarm Units
p. No. 1638 Visual Signaling Appliances
q. No. 1971 Visual Signaling Appliances
r. No. 2017 General-Purpose Signaling Devices and Systems
s. CAN/ULC S524-01 Standard for Installation of Fire Alarm Systems
t. The FACP shall be ANSI 864, 9th Edition Listed. Systems listed to ANSI 864, 8th edition (or previous revisions) shall not be accepted.

2. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.
3. Local and State Building Codes.
4. All requirements of the Authority Having Jurisdiction (AHJ).

1.08 APPROVALS

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:
1. FM Factory Mutual
2. MEA Material Equipment Acceptance (NYC)
3. CSFM California State Fire Marshal

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2.02 CONDUIT AND WIRE

A. Conduit:
1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4 inch (19.1 mm) minimum.

B. Wire:
1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).
5. Wiring used for the multiplex communication circuit (SLC) shall be twisted and support a minimum wiring distance of 10,000 feet when sized at 12 AWG. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit. Shielded wire shall not be required.
6. All field wiring (with exception of external communications Ethernet) shall be electrically supervised for open circuit and ground fault.
7. The fire alarm control panel shall be capable of T-tapping NFPA Style 4 (Class B) Signaling Line Circuits (SLCs). Systems which do not allow or have restrictions in, for example, the amount of T-taps, length of T-taps etc., is not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.

D. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

2.03 MAIN FIRE ALARM CONTROL PANEL

A. Existing Gamewell / FCI E3

2.04 SYSTEM COMPONENTS

A. See Fire Alarm Equipment Schedule on Drawings.

2.05 BATTERIES

A. Upon loss of Primary (AC) power to the control panel, the batteries shall have sufficient capacity to power the fire alarm system for required standby time (24 or 60 hours) followed by 15 minutes of alarm and evacuation.

B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

C. If necessary to meet standby requirements, external battery/charger systems may be used.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual pull stations shall be suitable for surface mounting or semi flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.02 TEST

A. The service of a competent, NICET level II technician shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 10.
   1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
   2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
   3. Verify activation of all waterflow switches.
   4. Open initiating device circuits and verify that the trouble signal actuates.
   5. Open and short signaling line circuits and verify that the trouble signal actuates.
   6. Open and short notification appliance circuits and verify that trouble signal actuates.
   7. Ground all circuits and verify response of trouble signals.
   8. Check presence and audibility of tone at all alarm notification devices.
   9. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
   10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
   11. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.03 FINAL INSPECTION

A. At the final inspection, a minimum NICET Level II technician shall demonstrate that the system functions properly in every respect.

3.04 INSTRUCTION

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor or installing dealer shall provide a user manual indicating "Sequence of Operation."

END OF SECTION

PROJECT MANUAL

LODI UNIFIED SCHOOL DISTRICT
H+A #21-32-051
February 10, 2023

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-120292 INC: 01
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 02/23/2023

MODERNIZATION
LODI MIDDLE SCHOOL

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art@amdfoodservicedesign.com

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marty@wceinc.com

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Sacramento, CA 95816
Contact: Bryan Walker
Voice: (916) 369-3990
bryan@mtwgroup.com

Owner
Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240
Contact: Ryan Lancaster
Voice: (209) 712-6339
rlancaster@lodiusd.net

LICENSED LANDSCAPE ARCHITECT — BRYAN HOLLIS WALKER — 5453 — SIGNATURE — 1/30/2 3 DATE — 7/31/2 3 RENEWAL DATE — STATE OF CALIFORNIA

LICENSED ARCHITECT — STEPHEN L. HENRY — C-22525 — 12/31/23 RENEWAL DATE — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — GREGORY I. RICHARDS — 18-4555 — Exp. 12/31/2024 — STRUCTURAL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — RYAN CELAYA — M 34234 — EXPIRES 12/31/24 — MECHANICAL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — JESSE U. BASTIAN — No. E20229 — Exp. 03-31-23 — ELECTRICAL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — ANTHONY J. TASSANO — NO. C74696 — CIVIL — STATE OF CALIFORNIA

DATE SIGNED: 01/30/23

PROJECT MANUAL

PROJECT/CONTRACT NUMBER:
0949-8429-440-15

MODERNIZATION LODI MIDDLE SCHOOL

LODI UNIFIED SCHOOL DISTRICT

October 5, 2024

DOCUMENT 00 01 10

TABLE OF CONTENTS

Procurement and Contracting Requirements

Division 0	Section	Title
	00 01 01	Project Title Page
	00 01 10	Table of Contents
	00 01 15	List of Drawings and Tables
	00 01 20	List of Schedules

Solicitation

Division 0	Section	Title
	00 11 16	Notice to Bidders

Instructions for Procurement

Division 0	Section	Title
	00 21 13	Instructions to Bidders
	00 21 13.1	Bidder Information and Forms

Available Information

Division 0	Section	Title
	00 31 19	Existing Conditions
	00 31 32	Geotechnical Data

Procurement Forms and Supplements

Division 0	Section	Title
	00 41 13	Bid Form and Proposal
	00 43 13	Bid Bond
	00 43 36	Designated Subcontractors List
	00 45 01	Site Visit Certification
	00 45 19	Non-Collusion Declaration
	00 45 19.01	Iran Contracting Act Certification
	00 45 26	Workers' Compensation Certification
	00 45 46.01	Prevailing Wage and Related Labor Requirements Certification
	00 45 46.02	Disabled Veteran Business Enterprise Participation Certification
	00 45 46.03	Drug-Free Workplace Certification
	00 45 46.04	Tobacco-Free Environment Certification
	00 45 46.05	Hazardous Materials Certification
	00 45 46.06	Lead-Based Materials Certification
	00 45 46.07	Imported Materials Certification
	00 45 46.08	Criminal Background Investigation/Fingerprinting Certification
	00 45 46.09	Buy American Certification
	00 45 46.10	Roofing Project Certification
	00 45 49	Registered Subcontractors List
	00 45 90	Post Bid Interview

Contracting Forms and Supplements

Division 0	Section	Title
	00 51 00	Notice of Award
	00 52 13	Agreement – Stipulated Sum (Single-Prime Contract)
	00 55 00	Notice to Proceed
	00 56 00	Escrow Bid Documentation
	00 57 00	Escrow Agreement in Lieu of Retention

Project Forms

Division 0	Section	Title
	00 61 13.13	Performance Bond
	00 61 13.16	Payment Bond
	00 63 40	Allowance Expenditure Directive Form
	00 63 57	Proposed Change Order Form
	00 63 63	Change Order Form
	00 65 19.26	Agreement and Release of Any and All Claims
	00 65 36	Guarantee Form

Conditions of the Contract

Division 0	Section	Title
	00 72 13	General Conditions – Stipulated Sum (Single-Prime Contract)
	00 73 13	Special Conditions
	00 73 56	Hazardous Materials Procedures and Requirements

General Requirements

Division 1	Section	Title
	01 11 00	Summary of Work

Price and Payment Procedures

Division 1	Section	Title
	01 21 00	Allowance
	01 22 00	Alternates and Unit Prices
	01 25 13	Product Options and Substitutions
	01 26 00	Changes in the Work
	01 29 00	Application for Payment and Conditional and Unconditional Waiver and Release Forms

Administrative Requirements

Division 1	Section	Title
	01 31 19	Project Meetings
	01 32 13	Scheduling of Work
	01 33 00	Submittals
	01 35 13.23	Site Standards

Quality Requirements

Division 1	Section	Title
	01 41 00	Regulatory Requirements
	01 42 13	Abbreviations and Acronyms
	01 42 16	Definitions
	01 42 19	References
	01 43 00	Materials and Equipment
	01 45 00	Quality Control

Temporary Facilities and Controls

Division 1	Section	Title
	01 50 00	Temporary Facilities and Controls
	01 50 13	Construction Waste Management and Disposal
	01 52 13	Field Offices
	01 57 13	Erosion Control

Product Requirements

Division 1	Section	Title
	01 64 00	Owner-Furnished Products
	01 66 00	Product Delivery, Storage and Handling

Execution and Closeout Requirements

Division 1	Section	Title
	01 71 23	Field Engineering
	01 73 29	Cutting and Patching
	01 76 00	Alteration Project Procedures
	01 77 00	Contract Closeout and Final Cleaning
	01 78 23	Operation and Maintenance Data
	01 78 36	Warranties
	01 78 39	Record Documents

Demolition

Division 02	Section	Title
	02 41 00	Site Demolition
	02 82 00	Asbestos Abatement and Disposal
	02 83 00	Lead-Containing Paint Removal and Lead-Related Construction
	02 87 00	Universal Waste (UW) Removal and Disposal/Recycling

Division 03	Section	Title
	03 00 00	Miscellaneous Concrete

Masonry

Division 04	Section	Title
	04 21 50	Adhered Thin Brick Veneer Units

Metals

Division 05	Section	Title
	05 50 00	Miscellaneous Metals

Wood

Division 06	Section	Title
	06 10 00	Rough Carpentry
	06 20 00	Finish Carpentry
	06 41 13	Wood Laboratory Casework-Oak Fronts
	06 41 14	Wood Laboratory Casework-P. Lam Fronts

Thermal and Moisture Protection

Division 07	Section	Title
	07 21 00	Thermal & Acoustical Insulation
	07 43 00	Metal Wall Panels
	07 54 20	Single Ply Roofing Membrane
	07 62 00	Sheet Metal Flashing and Trim
	07 92 00	Joint Sealants

Openings

Division 08	Section	Title
	08 11 13	Hollow Metal Doors and Frames
	08 30 50	Access Doors & Panels
	08 71 00	Door Hardware
	08 80 00	Glazing

Finishes

Division 09	Section	Title
	09 24 00	Cement Plaster
	09 29 00	Gypsum Board
	09 65 13	Resilient Flooring & Base
	09 67 23	Resinous Wall and Floor Coatings
	09 72 00	Fiberglass Reinforced Wall Panels
	09 91 13	Exterior Painting
	09 91 23	Interior Painting

Specialties

Division 10	Section	Title
	10 10 00	Chalkboards, Dry Marker Boards and Tackboards
	10 14 23	Signs
	10 17 00	Plastic Toilet Partitions
	10 28 00	Toilet Accessories
	10 44 16	Fire Extinguishers
	10 56 13	Metal Storage Shelving

Equipment

Division 11	Section	Title
	~~11 40 00~~	~~Foodservice Equipment~~

Furnishings

Division 12	Section	Title

	12 24 13	Window Roller Shades

Special Construction

Division 13	Section	Title
	13 34 23	Pre-Engineered Modular Buildings

Plumbing

Division 22	Section	Title
	22 00 50	Basic Plumbing Materials and Methods
	22 10 00	Plumbing Piping Systems
	22 40 00	Plumbing Fixtures
	22 50 00	Plumbing Equipment

Heating, Ventilating and Air Conditioning

Division 23	Section	Title
	(NOT USED)	

Electrical

Division 26	Section	Title
	26 01 00	General Requirements Of Electrical Work
	26 05 02	Supporting From Building Structure
	26 05 19	Low-Voltage Electrical Power Conductors and Cables
	26 05 26	Grounding and Bonding for Electrical Systems
	26 05 29	Hangers and Supports for Electrical Systems
	26 05 34	Conduit
	26 05 37	Boxes
	26 05 53	Identification for Electrical Systems
	26 08 01	Electrical Acceptance Testing
	26 22 00	Low-Voltage Transformers
	26 24 16	Panelboards
	26 27 26	Wiring Devices
	27 10 13	Structured Cabling Systems
	28 31 00	Fire Safety Integrated System

Earthwork

Division 31	Section	Title
	31 00 00	Earthwork
	31 13 16	Tree Protection
	31 23 33	Trenching and Backfilling

Exterior Improvements

Division 32	Section	Title
	32 12 00	Asphalt Paving
	32 16 00	Site Concrete
	32 80 00	Irrigation
	32 90 00	Landscaping

Utilities

Division 33	Section	Title
	33 00 00	Site Utilities
	33 40 00	Site Drainage

APPENDIX

Pre-Renovation Hazardous Materials Survey

DOCUMENT 00 01 15

LIST OF DRAWINGS AND TABLES

DRAWINGS

(see Drawings, sheet CS, Cover Sheet for Sheet Index)

DOCUMENT 00 01 20

LIST OF SCHEDULES

SCHEDULES

(see Drawings for Drawing Schedules)

END OF DOCUMENT

DOCUMENT 00 11 16

NOTICE TO BIDDERS

1. Notice is hereby given that the governing board ("Board") of the Lodi Unified School District ("District") will receive sealed bids for the following project, Bid No. 0949-8429-440-15 ("Project" or "Contract"):

   Modernization Lodi Middle School

2. The Project consists of:

   1) Removal and replacement of walkways around classrooms.

   2) Modernization of toilet rooms at building F.

   3) Undercutting of existing doors & installation of new door bottoms & thresholds at new walkways.

   4) Sealing of brick veneer finish at all building exteriors.

   5) Other work as indicated in the Construction Documents.

3. To bid this Project, the Bidder is required to possess one or more of the following State of California contractors' license(s)**:**

   A, General Engineering Contractor and/or B General Building Contractor

   The Bidder's license(s) must remain active and in good standing throughout the term of the Contract.

4. To bid this Project, the Bidder is required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code.

5. Contract Documents will be available on or after **October 5, 2024**, for review on the District's website, **www.lodiusd.net/about/bonds#facilities** using the "***Facilities and Planning (F&P)Projects*"** link. In addition, Contract Documents are available for bidders' review at the following builders' exchanges:

   A. Bay Area Builder's Exchange (510) 352-1509
   B. Builder's Exchange of Santa Clara County (408) 727–2779
   C. Builder's Exchange of Stockton (209) 478–1000
   D. Valley Builder's Exchange (209) 522-0616
   E. Placer County Contractors Association (916) 771–7229
   F. Sacramento Regional Builders Exchange (916) 446–3117

6. RESERVED

7. Sealed bids will be received until **3:00 p.m., October 24, 2024** at the District Facilities Office, 880 N. Guild Avenue, Lodi California 95240 at or after which time the bids will be opened and publicly read aloud. Any bid that is submitted after this time shall be nonresponsive and returned to the bidder. Any claim by a bidder of

error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code.

8. Pursuant to Public Contract Code section 20111.6, only prequalified bidders will be eligible to submit a bid for contracts $1 million or more using or planning to use state bond funds. Any bid submitted by a bidder who is not prequalified shall be non-responsive and returned unopened to the bidder. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses, if used, who have not been prequalified, shall be deemed nonresponsive and will not be considered.

9. All bids shall be on the form provided by the District. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.

10. A bid bond by an admitted surety insurer on the form provided by the District a cashier's check or a certified check, drawn to the order of the Lodi Unified School District, in the amount of ten percent (10%) of the total bid price, shall accompany the Bid Form and Proposal, as a guarantee that the Bidder will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the District for the performance of the services as stipulated in the bid.

11. **A mandatory pre-bid conference and site visit will be held on October 15, 2024 at 11:00 am at Lodi Middle School, 945 S Ham Lane, Lodi, CA 95242.** All participants are required to sign in at the site to be eligible to bid the project. Failure to attend or tardiness will render bid ineligible.

12. The successful Bidder shall be required to furnish a 100% Performance Bond and a 100% Payment Bond if it is awarded the Contract for the Work.

13. The successful Bidder may substitute securities for any monies withheld by the District to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.

14. The successful bidder will be required to certify that it either meets the Disabled Veteran Business Enterprise ("DVBE") goal of three percent (3%) participation or made a good faith effort to solicit DVBE participation in this Contract if it is awarded the Contract for the Work.

15. The Contractor and all Subcontractors under the Contractor shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to section 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <http://www.dir.ca.gov>.

16. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and subject to the requirements of Title 8 of the California Code of Regulations. The successful Bidder shall comply with all requirements of Division 2, Part 7, Chapter 1, Articles 1-5 of the Labor Code.

17. This Project is subject to Buy American requirements.

18. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on:

    A. The base bid amount only.

19. The Board reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the District awards the Contract, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

END OF DOCUMENT

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

Bidders shall follow the instructions in this document, and shall submit all documents, forms, and information required for consideration of a bid.

Lodi Unified School District ("District") will evaluate information submitted by the apparent low Bidder and, if incomplete or unsatisfactory to District, Bidder's bid may be rejected at the sole discretion of District.

1. Bids are requested for a general construction contract, or work described in general, for the following project ("Project" or "Contract"):

   Modernization Lodi Middle School

2. A Bidder and its subcontractors must possess the appropriate State of California contractors' license and must maintain the license throughout the duration of the project. Bidders must also be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. Bids submitted by a contractor who is not properly licensed or registered shall be deemed nonresponsive and will not be considered.

3. The District has prequalified bidders pursuant to Public Contract Code section 20111.6 for contracts $1 million or more using or planning to use state bond funds. Only prequalified bidders will be eligible to submit a bid for this Project. Any bid submitted by a bidder who is not prequalified shall be deemed nonresponsive and will not be considered. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses, if used, who have not been prequalified, shall be deemed nonresponsive and will not be considered.

4. District will receive sealed bids from bidders as stipulated in the Notice to Bidders.

   a. All bids must be sealed in an envelope, marked with the name and address of the Bidder, name of the Project, the Project Number and/or bid number, and time of bid opening.

   b. Bids must be submitted to the District Office by date and time shown in the Notice to Bidders.

   c. Bids must contain all documents as required herein.

5. Bidders are advised that on the date that bids are opened, telephones will not be available at the District Offices for use by bidders or their representatives.

6. Bids will be opened at or after the time indicated for receipt of bids.

7. Bidders must submit bids on the documents titled Bid Form and Proposal, and must submit all other required District forms. Bids not submitted on the District's required forms shall be deemed nonresponsive and shall not be considered. Additional sheets required to fully respond to requested information are permissible.

8. Bidders shall not modify the Bid Form and Proposal or qualify their bids. Bidders shall not submit to the District a re-formatted, re-typed, altered, modified, or otherwise recreated version of the Bid Form and Proposal or other District-provided document.

9. Bids shall be clearly written and without erasure or deletions. District reserves the right to reject any bid containing erasures, deletions, or illegible contents.

10. Bidders must supply all information required by each Bid Document. Bids must be full and complete. District reserves the right in its sole discretion to reject any bid as nonresponsive as a result of any error or omission in the bid. Bidders must complete and submit all of the following documents with the Bid Form and Proposal:

    a. Bid Bond on the District's form, or other security.

    b. Designated Subcontractors List.

    c. Site Visit Certification, if a site visit was required.

    d. Non-Collusion Declaration.

    e. Iran Contracting Act Certification, if contract value is $1,000,000 or more.

    f. OCIP Insurance forms

11. Bidders must submit with their bids cash, a cashier's check or a certified check payable to District, or a bid bond by an admitted surety insurer of not less than ten percent (10%) of amount of Base Bid, plus all additive alternates ("Bid Bond"). If Bidder chooses to provide a Bid Bond as security, Bidder must use the required form of corporate surety provided by District. The Surety on Bidder's Bid Bond must be an insurer admitted in the State of California and authorized to issue surety bonds in the State of California. Bids submitted without necessary bid security will be deemed nonresponsive and will not be considered.

12. If Bidder to whom the Contract is awarded fails or neglects to enter into the Contract and submit required bonds, insurance certificates, and all other required documents, within **SEVEN (7)** calendar days after the date of the Notice of Award, District may deposit Bid Bond, cash, cashier's check, or certified check for collection, and proceeds thereof may be retained by District as liquidated damages for failure of Bidder to enter into Contract, in the sole discretion of District. It is agreed that calculation of damages District may suffer as a result of Bidder's failure to enter into the Contract would be extremely difficult and impractical to determine and that the amount of the Bidder's required bid security shall be the agreed and conclusively presumed amount of damages.

13. Bidders must submit with the bid the Designated Subcontractors List for those subcontractors who will perform any portion of Work, including labor, rendering of service, or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of total bid. Failure to submit this list when required by law shall result in bid being deemed nonresponsive and the bid will not be considered.

14. All of the listed subcontractors are required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code.

    a. An inadvertent error in listing the California contractor license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.

    b. An inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:

        (1) The subcontractor is registered prior to the bid opening.

        (2) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.

        (3) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

15. If a mandatory pre-bid conference and site visit ("Site Visit") is required as referenced in the Notice to Bidders, then Bidders must submit the Site Visit Certification with their Bid. District will transmit to all prospective Bidders of record such Addenda as District in its discretion considers necessary in response to questions arising at the Site Visit. Oral statements shall not be relied upon and will not be binding or legally effective. Addenda issued by the District as a result of the Site Visit, if any, shall constitute the sole and exclusive record and statement of the results of the Site Visit.

16. Bidders shall submit the Non-Collusion Declaration with their bids. Bids submitted without the Non-Collusion Declaration shall be deemed nonresponsive and will not be considered.

17. The Contractor and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to the Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the Department of Industrial Relations, are available upon

request at the District's principal office. Prevailing wage rates are also available on the internet at http://www.dir.ca.gov.

Since the Project is funded in whole or in part with federal funds, the Contractor and all Subcontractors under the Contractor shall comply with the Davis-Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. If a conflict exists with a state requirement, the more stringent provision shall control.

18. The District has entered into a Project Labor Agreement that is applicable to this Project. A copy of the Project Labor Agreement is available for review at the District Facilities Office and may be downloaded from the District's website,

19. The District has elected to provide an owner-controlled or wrap-up insurance program ("OCIP"). The policy limits, known exclusions, and the length of time the policy is intended to remain in effect provided by the OCIP are described in the OCIP Manual. The District will require all bidders at a minimum to have no serious and willful violations of Labor Code section 6300 et seq., have a workers' compensation experience modification factor of 1.00 or less, and have an injury prevention program instituted pursuant to Labor Code sections 3201.5 or 6401.7 .

20. Section 17076.11 of the Education Code requires school districts using funds allocated pursuant to the State of California School Facility Program for the construction and/or modernization of school building(s) to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended on projects that receive state funding or demonstrate its good faith effort to solicit DVBE participation in this Contract. In order to meet this requirement by demonstrating a good faith effort, Bidder must advertise for DVBE-certified subcontractors and suppliers before submitting its Bid. For any project that is at least partially state-funded, the lowest responsive responsible Bidder awarded the Contract must submit certification of compliance with the procedures for implementation of DVBE contracting goals with its signed Agreement. DVBE Certification form is attached. Do not submit this form with your Bid.

21. Submission of bid signifies careful examination of Contract Documents and complete understanding of the nature, extent, and location of Work to be performed. Bidders must complete the tasks listed below as a condition to bidding, and submission of a bid shall constitute the Bidder's express representation to District that Bidder has fully completed the following:

    a. Bidder has visited the Site, if required, and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions, and all local conditions and federal, state and local laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto;

b. Bidder has conducted or obtained and has understood all examinations, investigations, explorations, tests, reports, and studies that pertain to the subsurface conditions, as-built conditions, underground facilities, and all other physical conditions at or contiguous to the Site or otherwise that may affect the cost, progress, performance, or furnishing of Work, as Bidder considers necessary for the performance or furnishing of Work at the Contract Sum, within the Contract Time, and in accordance with the other terms and conditions of Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies, or similar information or data are or will be required by Bidder for such purposes;

c. Bidder has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents;

d. Bidder has given the District prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and the actual conditions, and the written resolution(s) thereof by the District is/are acceptable to Bidder;

e. Bidder has made a complete disclosure in writing to the District of all facts bearing upon any possible interest, direct or indirect, that Bidder believes any representative of the District or other officer or employee of the District presently has or will have in this Contract or in the performance thereof or in any portion of the profits thereof;

f. Bidder must, prior to bidding, perform the work, investigations, research, and analysis required by this document and that Bidder represented in its Bid Form and Proposal and the Agreement that it performed prior to bidding. Contractor under this Contract is charged with all information and knowledge that a reasonable bidder would ascertain from having performed this required work, investigation, research, and analysis. Bid prices must include entire cost of all work "incidental" to completion of the Work.

g. Conditions Shown on the Contract Documents: Information as to underground conditions, as-built conditions, or other conditions or obstructions, indicated in the Contract Documents, e.g., on Drawings or in Specifications, has been obtained with reasonable care, and has been recorded in good faith. However, District only warrants, and Bidder may only rely, on the accuracy of limited types of information.

    (1) As to above-ground conditions or as-built conditions shown or indicated in the Contract Documents, there is no warranty, express or implied, or any representation express or implied, that such information is correctly shown or indicated. This information is verifiable by independent investigation and Bidder is required to make such verification as a condition to bidding. In submitting its Bid, Bidder shall rely on the results of its own independent investigation. In submitting its Bid, Bidder shall not rely on District-supplied information regarding above-ground conditions or as-built conditions.

(2) As to any subsurface condition shown or indicated in the Contract Documents, Bidder may rely only upon the general accuracy of actual reported depths, actual reported character of materials, actual reported soil types, actual reported water conditions, or actual obstructions shown or indicated. District is not responsible for the completeness of such information for bidding or construction; nor is District responsible in any way for any conclusions or opinions that the Bidder has drawn from such information; nor is the District responsible for subsurface conditions that are not specifically shown (for example, District is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown).

h. Conditions Shown in Reports and Drawings Supplied for Informational Purposes: Reference is made to the document entitled Geotechnical Data, and the document entitled Existing Conditions, for identification of:

(1) Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by Architect in preparing the Contract Documents; and

(2) Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that has been utilized by Architect in preparing the Contract Documents.

(3) These reports and drawings are **not** Contract Documents and, except for any "technical" data regarding subsurface conditions specifically identified in Geotechnical Data and Existing Conditions, and underground facilities data, Bidder may not in any manner rely on the information in these reports and drawings. Subject to the foregoing, Bidder must make its own independent investigation of all conditions affecting the Work and must not rely on information provided by District.

22. Bids shall be based on products and systems specified in Contract Documents or listed by name in Addenda. Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Bidder may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified. The District is not responsible and/or liable in any way for a Contractor's damages and/or claims related, in any way, to that Contractor's basing its bid on any requested substitution that the District has not approved in advance and in writing. Contractors and materials suppliers who submit requests for substitutions prior to the award of the Contract must do so in writing and in compliance with Public Contract Code section 3400. All requests must comply with the following:

a. District must receive any notice of request for substitution of a specified item a minimum of **TEN (10)** calendar days prior to bid opening. The Successful Bidder will not be allowed to substitute specified items unless properly noticed.

b. Within 35 days after the date of the Notice of Award, the Successful Bidder shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the Specifications. Insufficient information shall be grounds for rejection of substitution.

c. Approved substitutions, if any, shall be listed in Addenda. District reserves the right not to act upon submittals of substitutions until after bid opening.

d. Substitutions may be requested after Contract has been awarded only if indicated in and in accordance with requirements specified in the Special Conditions and the Specifications.

23. Bidders may examine any available "as-built" drawings of previous work by giving District reasonable advance notice. District will not be responsible for accuracy of "as-built" drawings. The document entitled Existing Conditions applies to all supplied "as-built" drawings.

24. All questions about the meaning or intent of the Contract Documents are to be directed via email to the Architect . Interpretations or clarifications considered necessary by the District in response to such questions will be issued in writing by Addenda and emailed, faxed, mailed, or delivered to all parties recorded by the District as having received the Contract Documents or posted on the District's website . Questions received less than **SEVEN (7)** calendar days prior to the date for opening bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

25. Addenda may also be issued to modify other parts of the Contract Documents as deemed advisable by the District.

26. Each Bidder must acknowledge each Addendum in its Bid Form and Proposal by number or its Bid shall be considered non-responsive. Each Addendum shall be part of the Contract Documents. A complete listing of Addenda may be secured from the District.

27. This Contract may include alternates. Alternates are defined as alternate products, materials, equipment, systems, methods, or major elements of the construction that may, at the District's option and under terms established in the Contract and pursuant to section 20103.8 of the Public Contract Code, be selected for the Work.

28. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on the criteria as indicated in the Notice to Bidders. In the event two or more responsible bidders submit identical bids, the District shall select the Bidder to whom to award the Contract by lot.

29. Discrepancies between written words and figures, or words and numerals, will be resolved in favor of figures or numerals.

30. Bidders in contention for contract awards shall be required to attend a Post-Bid interview, which will be set within three (3) calendar days following bid opening. A duly authorized representative of the apparent low bidder is required to attend the

Post Bid Interview, in person. The apparent low bidder's authorized representative(s) must have (1) knowledge of how the bid submitted was prepared, (2) the person responsible for supervising performance of the Work, and (3) the authority to bind the apparent low bidder. Failure to attend the Post Bid Interview as scheduled will be considered just cause for the District to reject the Bid as nonresponsive.

31. Any bid protest by any Bidder regarding any other bid must be submitted in writing to the District, before 5:00 p.m. of the **THIRD (3rd)** business day following bid opening.

    a. Only a Bidder who has actually submitted a bid, and who could be awarded the Contract if the bid protest is upheld, is eligible to submit a bid protest. Subcontractors are not eligible to submit bid protests. A Bidder may not rely on the bid protest submitted by another Bidder.

    b. A bid protest must contain a complete statement of any and all bases for the protest and all supporting documentation. Materials submitted after the bid protest deadline will not be considered.

    c. The protest must refer to the specific portions of all documents that form the basis for the protest.

        (1) Without limitation to any other basis for protest, an inadvertent error in listing the California contractor's license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.

        (2) Without limitation to any other basis for protest, an inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:

            (i) The subcontractor is registered prior to the bid opening.

            (ii) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.

            (iii) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

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

    e. The party filing the protest must concurrently transmit a copy of the protest and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

f. The procedure and time limits set forth in this paragraph are mandatory and are each bidder's sole and exclusive remedy in the event of bid protest. Failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.

32. The Bidder to whom Contract is awarded shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award. Failure to properly and timely submit these documents entitles District to reject the bid as nonresponsive.

a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.

b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.

c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

d. Payment Bond (Contractor's Labor and Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

e. Insurance Certificates and Endorsements as required.

f. Workers' Compensation Certification.

g. Prevailing Wage and Related Labor Requirements Certification.

h. Disabled Veteran Business Enterprise Participation Certification.

i. Drug-Free Workplace Certification.

j. Tobacco-Free Environment Certification.

k. Hazardous Materials Certification.

l. Lead-Based Materials Certification.

m. Imported Materials Certification.

n. Criminal Background Investigation/Fingerprinting Certification.

o. Buy American Certification.

p. Roofing Project Certification: from Contractor, Material Manufacturer and/or Vendor.

q. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

33. Time for Completion: District may issue a Notice to Proceed within **NINETY (90)** days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

    a. In the event that the District desires to postpone issuing the Notice to Proceed beyond this 90-day period, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed.

    b. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed beyond a 90-day period. If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to the Contractor, the Contractor may terminate the Contract. Contractor's termination due to a postponement beyond this 90-day period shall be by written notice to District within **TEN (10)** calendar days after receipt by Contractor of District's notice of postponement.

    c. It is further understood by the Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and which the District had in writing authorized Contractor to perform prior to issuing a Notice to Proceed.

    d. Should the Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

34. District reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional bids, to re-bid, and to reject the bid of any bidder if District believes that it would not be in the best interest of the District to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by District. District also reserves the right to waive any inconsequential deviations or irregularities in any bid. For purposes of this paragraph, an "unbalanced bid" is one having nominal prices for some work items and/or enhanced prices for other work items.

35. It is the policy of the District that no qualified person shall be excluded from participating in, be denied the benefits of, or otherwise be subjected to discrimination in any consideration leading to the award of contract, based on race, color, gender, sexual orientation, political affiliation, age, ancestry, religion, marital status, national origin, medical condition or disability. The Successful Bidder and its subcontractors shall comply with applicable federal and state laws, including, but not limited to the California Fair Employment and Housing Act, beginning with Government Code section 12900, and Labor Code section 1735.

36. Prior to the award of Contract, District reserves the right to consider the responsibility of the Bidder. District may conduct investigations as District deems

necessary to assist in the evaluation of any bid and to establish the responsibility, including, without limitation, qualifications and financial ability of Bidders, proposed subcontractors, suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to District's satisfaction within the prescribed time.

END OF DOCUMENT

DOCUMENT 00 21 13.1

BIDDER INFORMATION AND FORMS

[INTENTIONALLY LEFT BLANK UNLESS PROVIDED IN SPECIAL CONDITIONS – SEPARATE PREQUALIFICATION PROCESS RECOMMENDED]

END OF DOCUMENT

DOCUMENT 00 31 19

EXISTING CONDITIONS

1. Summary

This document describes existing conditions at or near the Project, and use of information available regarding existing conditions. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Reports and Information on Existing Conditions

a. Documents providing a general description of the Site and conditions of the Work may have been collected by the Lodi Unified School District ("District"), its consultants, contractors, and tenants. These documents may, but are not required to, include previous contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, and information regarding underground facilities.

b. Information regarding existing conditions may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports, documents, and other information are **not** part of the Contract Documents. These reports, documents, and other information do **not** excuse Contractor from fulfilling Contractor's obligation to independently investigate any or all existing conditions or from using reasonable prudent measures to avoid damaging existing improvements.

c. Information regarding existing conditions may also be included in the Project Manual, but shall **not** be considered part of the Contract Documents.

d. Prior to commencing this Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey.

e. Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

f. The reports and other data or information regarding existing conditions and underground facilities at or contiguous to the Project are the following:

(1) Original Construction Drawings.
(2) Survey of Site.
(3) Geotechnical Report(s).
(4) Hazardous Material Report(s).
(5) Videotaped Survey(s).

3. Use of Information

a. Information regarding existing conditions was obtained only for use of District and its consultants, contractors, and tenants for planning and design and is **not** part of the Contract Documents.

b. District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any information regarding existing conditions. Bidder represents and agrees that in submitting a bid it is not relying on any information regarding existing conditions supplied by District.

c. Under no circumstances shall District be deemed to warrant or represent existing above-ground conditions, as-built conditions, or other actual conditions, verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform as a condition to bidding and Bidder should not and shall not rely on this information or any other information supplied by District regarding existing conditions.

d. Any information shown or indicated in the reports and other data supplied herein with respect to existing underground facilities at or contiguous to the Project may be based upon information and data furnished to District by the District's employees and/or consultants or builders of such underground facilities or others. District does not assume responsibility for the completeness of this information, and Bidder is solely responsible for any interpretation or conclusion drawn from this information.

e. District shall be responsible only for the general accuracy of information regarding underground facilities, and only for those underground facilities that are owned by District, and only where Bidder has conducted the independent investigation required of it pursuant to the Instructions to Bidders, and discrepancies are not apparent.

4. Investigations/Site Examinations

a. Before submitting a bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract

Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

DOCUMENT 00 31 32

GEOTECHNICAL DATA

1. Summary

This document describes geotechnical data at or near the Project that is in the District's possession available for Contractor's review, and use of data resulting from various investigations. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Geotechnical Reports

a. Geotechnical reports may have been prepared for and around the Site and/or in connection with the Work by soil investigation engineers hired by Lodi Unified School District ("District"), and its consultants, contractors, and tenants.

b. Geotechnical reports may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports are **not** part of the Contract Documents.

c. The reports and drawings of physical conditions that may relate to the Project are the following:

Geotechnical Engineering and Geological Hazards Report
LODI MIDDLE SCHOOL MODULAR CLASSROOM BUILDING P2
WKA No. 4630.2200036.0016, APRIL 29, 2022

3. Use of Data

a. Geotechnical data were obtained only for use of District and its consultants, contractors, and tenants for planning and design and are **not** a part of Contract Documents.

b. Except as expressly set forth below, District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical data. Bidder represents and agrees that in submitting a bid it is not relying on any geotechnical data supplied by District, except as specifically allowed below.

c. Under no circumstances shall District be deemed to make a warranty or representation of existing above ground conditions, as-built conditions, geotechnical conditions, or other actual conditions verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder should perform as a condition to bidding and Bidder must not and shall not rely on information supplied by District.

4. Limited Reliance Permitted on Certain Information

a. Reference is made herein for identification of:

Reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by District in preparation of the Contract Documents.

Drawings of physical conditions in or relating to existing subsurface structures (except underground facilities) that are at or contiguous to the Site and have been utilized by District in preparation of the Contract Documents.

b. Bidder may rely upon the general accuracy of the "technical data" contained in the reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required pursuant to Instructions to Bidders, and discrepancies are not apparent. The term "technical data" in the referenced reports and drawings shall be limited as follows:

(1) The term "technical data" shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment or structures that were encountered during subsurface exploration. The term "technical data" does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in such drawings or reports that otherwise relate to subsurface conditions or described structures.

(2) The term "technical data" shall not include the location of underground facilities.

(3) Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder may rely upon the general accuracy of the "technical data" contained in such reports or drawings.

(4) Bidder is solely responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions, or information provided in the identified reports and drawings.

5. Investigations/Site Examinations

a. Before submitting a bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each

Bidder deems necessary for submission of a bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

DOCUMENT 00 41 13

BID FORM AND PROPOSAL

To: Governing Board of the Lodi Unified School District ("District" or "Owner")

From: _____
(Proper Name of Bidder)

The undersigned declares that Bidder has read and understands the Contract Documents, including, without limitation, the Notice to Bidders and the Instructions to Bidders, and agrees and proposes to furnish all necessary labor, materials, and equipment to perform and furnish all work in accordance with the terms and conditions of the Contract Documents, including, without limitation, the Drawings and Specifications of Bid No 0949-8429-440-15 for the following project known as:

Modernization Lodi Middle School

("Project" or "Contract") and will accept in full payment for that Work the following total lump sum amount, all taxes included:

_____	dollars	$ _____
A: BID AMOUNT - MODERNIZATION LODI MIDDLE SCHOOL		
_____	dollars	$ _____
B: ALLOWANCE (10% of Base Bid)		
_____	dollars	$ _____
C: TOTAL BID (Base Bid + Allowance)		

Descriptions of alternates are primarily scope definitions and do not necessarily detail the full range of materials and processes needed to complete the construction.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

Additional Detail Regarding Calculation of Base Bid

1. **Allowance**. The Bidder's Base Bid shall include an allowance for unforeseen items. The allowance will be a stipulated sum/price of **10% OF BASE BID**.

   The above allowance shall only be allocated for unforeseen items relating to the Work. Contractor shall not bill for or be due any portion of this allowance unless the District has identified specific work, Contractor has submitted a price for that work or the District has proposed a price for that work, the District has accepted the cost for that work, and the District has prepared an Allowance Expenditure Directive incorporating that work. Contractor hereby authorizes the District to execute a unilateral deductive change order at or near the end of the Project for all or any portion of the allowance not allocated.

2. The undersigned has reviewed the Work outlined in the Contract Documents and fully understands the scope of Work required in this Proposal, understands the construction and project management function(s) is described in the Contract Documents, and that each Bidder who is awarded a contract shall be in fact a prime contractor, not a subcontractor, to the District, and agrees that its Proposal, if accepted by the District, will be the basis for the Bidder to enter into a contract with the District in accordance with the intent of the Contract Documents.

3. The undersigned has notified the District in writing of any discrepancies or omissions or of any doubt, questions, or ambiguities about the meaning of any of the Contract Documents, and has contacted the Construction Manager before bid date to verify the issuance of any clarifying Addenda.

4. The undersigned agrees to commence work under this Contract on the date established in the Contract Documents and to complete all work within the time specified in the Contract Documents.

5. The liquidated damages clause of the General Conditions and Agreement is hereby acknowledged.

6. It is understood that the District reserves the right to reject this bid and that the bid shall remain open to acceptance and is irrevocable for a period of ninety (90) days.

7. The following documents are attached hereto:

   - Bid Bond on the District's form or other security
   - Designated Subcontractors List
   - Site Visit Certification
   - Non-Collusion Declaration
   - Iran Contracting Act Certification

8. Receipt and acceptance of the following Addenda is hereby acknowledged:

No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____

9. Bidder acknowledges that the license required for performance of the Work is an A or a B license.

10. Bidder hereby certifies that Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.

11. Bidder specifically acknowledges and understands that if it is awarded the Contract, that it shall perform the Work of the Project while complying with all requirements of the Department of Industrial Relations.

12. Bidder hereby certifies that its bid includes sufficient funds to permit Bidder to comply with all local, state or federal labor laws or regulations during the Project, including payment of prevailing wage, and that Bidder will comply with the provisions of Labor Code section 2810(d) if awarded the Contract

13. Bidder represents that it is competent, knowledgeable, and has special skills with respect to the nature, extent, and inherent conditions of the Work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the Work that may create, during the Work, unusual or peculiar unsafe conditions hazardous to persons and property.

14. Bidder expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the Work with respect to such hazards.

15. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Gov. Code, § 12650 et seq.), the District will be entitled to civil remedies set forth in the California False Claim Act. It may also be considered fraud and the Contractor may be subject to criminal prosecution.

16. The undersigned Bidder certifies that it is, at the time of bidding, and shall be throughout the period of the Contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents and registered as a public works contractor with the Department of Industrial Relations. Bidder further certifies that it is regularly engaged in the general class and type of work called for in the Contract Documents.

Furthermore, Bidder hereby certifies to the District that all representations, certifications, and statements made by Bidder, as set forth in this bid form, are true and correct and are made under penalty of perjury.

Dated this _____ day of _____ 20 ____

Name of Bidder: _____

Type of Organization: _____

Signed by: _____

Title of Signer: _____

Address of Bidder: _____

Taxpayer Identification No. of Bidder: _____

Telephone Number: _____

Fax Number: _____

E-mail: _____ Web Page: _____

Contractor's License No(s): No.: _____ Class: _____ Expiration Date: _____

No.: _____ Class:_____ Expiration Date: _____

No.: _____ Class:_____ Expiration Date: _____

Public Works Contractor Registration No.: _____

END OF DOCUMENT

DOCUMENT 00 43 13

BID BOND

(Note: If Bidder is providing a bid bond as its bid security, Bidder must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

That the undersigned,_____, as Principal ("Principal"),

and _____, as Surety ("Surety"), a corporation organized and existing under and by virtue of the laws of the State of California and authorized to do business as a surety in the State of California, are held and firmly bound unto the Lodi Unified School District ("District") of San Joaquin County, State of California, as Obligee, in an amount equal to ten percent (10%) of the Base Bid plus alternates, in the sum of

_____ Dollars ($ _____)

lawful money of the United States of America, for the payment of which sum well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a bid to the District for all Work specifically described in the accompanying bid for the following project: Modernization Lodi Middle School ("Project" or "Contract").

NOW, THEREFORE, if the Principal is awarded the Contract and, within the time and manner required under the Contract Documents, after the prescribed forms are presented to Principal for signature, enters into a written contract, in the prescribed form in accordance with the bid, and files two bonds, one guaranteeing faithful performance and the other guaranteeing payment for labor and materials as required by law, and meets all other conditions to the Contract between the Principal and the Obligee becoming effective, or if the Principal shall fully reimburse and save harmless the Obligee from any damage sustained by the Obligee through failure of the Principal to enter into the written contract and to file the required performance and labor and material bonds, and to meet all other conditions to the Contract between the Principal and the Obligee becoming effective, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect. The full payment of the sum stated above shall be due immediately if Principal fails to execute the Contract within seven (7) days of the date of the District's Notice of Award to Principal.

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

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

If the District awards the bid, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

IN WITNESS WHEREOF, this instrument has been duty executed by the Principal and Surety above named, on the _____ day of _____, 20___.

_____
Principal

_____
By

_____
Surety

_____
By

_____
Name of California Agent of Surety

_____
Address of California Agent of Surety

_____
Telephone Number of California Agent of Surety

Bidder must attach Power of Attorney and Certificate of Authority for Surety and a Notarial Acknowledgment for all Surety's signatures. The California Department of Insurance must authorize the Surety to be an admitted Surety Insurer.

END OF DOCUMENT

DOCUMENT 00 43 36

DESIGNATED SUBCONTRACTORS LIST
(Public Contact Code Sections 4100-4114)

PROJECT: **Modernization Lodi Middle School**

Bidder acknowledges and agrees that it must clearly set forth below the name, location and California contractor license number of each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the Work or who will specially fabricate and install a portion of the Work according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent (0.5%) of Bidder's total Base Bid and the kind of Work that each will perform. Vendors or suppliers of materials only do not need to be listed.

Bidder acknowledges and agrees that, if Bidder fails to list as to any portion of Work, or if Bidder lists more than one subcontractor to perform the same portion of Work, Bidder must perform that portion itself or be subjected to penalty under applicable law. In case more than one subcontractor is named for the same kind of Work, state the portion of the kind of Work that each subcontractor will perform.

If alternate bid(s) is/are called for and Bidder intends to use subcontractors different from or in addition to those subcontractors listed for work under the Base Bid, Bidder must list subcontractors that will perform Work in an amount in excess of one half of one percent (0.5%) of Bidder's total Base Bid plus alternate(s).

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 01

SITE VISIT CERTIFICATION

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
IF SITE VISIT WAS MANDATORY

PROJECT: **Modernization Lodi Middle School**

Check option that applies:

_____ I certify that I visited the Site of the proposed Work, received the attached _____ pages of information, and became fully acquainted with the conditions relating to construction and labor. I fully understand the facilities, difficulties, and restrictions attending the execution of the Work under contract.

_____ I certify that _____ (Bidder's representative) visited the Site of the proposed Work, received the attached _____ pages of information, and became fully acquainted with the conditions relating to construction and labor. The Bidder's representative fully understood the facilities, difficulties, and restrictions attending the execution of the Work under contract.

Bidder fully indemnifies the Lodi Unified School District, its Architect, its Engineers, its Construction Manager, and all of their respective officers, agents, employees, and consultants from any damage, or omissions, related to conditions that could have been identified during my visit and/or the Bidder's representative's visit to the Site.

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

ATTACHMENTS:

1.

2.

3.

END OF DOCUMENT

DOCUMENT 00 45 19

NON-COLLUSION DECLARATION
(Public Contract Code Section 7106)

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.
[Title] [Name of Firm]

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

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

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

at _____, _____.
[City] [State]

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 19.01

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Sections 2202-2208)

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Prior to bidding on or submitting a proposal for a contract for goods or services of $1,000,000 or more, the bidder/proposer must submit this certification pursuant to Public Contract Code section 2204.

The bidder/proposer must complete **ONLY ONE** of the following two options. To complete OPTION 1, check the corresponding box **and** complete the certification below. To complete OPTION 2, check the corresponding box, complete the certification below, and attach documentation demonstrating the exemption approval.

☐ **OPTION 1.** Bidder/Proposer is not on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code section 2203(b), and we are not a financial institution extending twenty million dollars ($20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.

☐ **OPTION 2.** Bidder/Proposer has received a written exemption from the certification requirement pursuant to Public Contract Code sections 2203(c) and (d). *A copy of the written documentation demonstrating the exemption approval is included with our bid/proposal.*

CERTIFICATION:

I, the official named below, CERTIFY UNDER PENALTY OF PERJURY, that I am duly authorized to legally bind the bidder/proposer to the OPTION selected above. This certification is made under the laws of the State of California.

Vendor Name/Financial Institution (Printed)	*Federal ID Number (or n/a)*
By (Authorized Signature)	
Printed Name and Title of Person Signing	*Date Executed*

END OF DOCUMENT

DOCUMENT 00 45 26

WORKERS' COMPENSATION CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Labor Code section 3700, in relevant part, provides:

> Every employer except the State shall secure the payment of compensation in one or more of the following ways:
>
> a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state; and/or
>
> b. By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

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

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

(In accordance with Labor Code sections 1860 and 1861, the above certificate must be signed and filed with the awarding body prior to performing any Work under this Contract.)

END OF DOCUMENT

DOCUMENT 00 45 46.01

PREVAILING WAGE AND RELATED LABOR REQUIREMENTS CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

I hereby certify that I will conform to the State of California Public Works Contract requirements regarding prevailing wages, benefits, on-site audits with 48-hours' notice, payroll records, and apprentice and trainee employment requirements, for all Work on the above Project including, without limitation, labor compliance monitoring and enforcement by the Department of Industrial Relations.

[IF THIS PROJECT USES FEDERAL FUNDS, DISTRICT SHOULD INCLUDE THE FOLLOWING] I hereby certify that I will also conform to the Federal Labor Standards Provisions regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon and Related Act requirements, Contract Work Hours and Safety Standards Act requirements, and any and all other applicable requirements for federal funding for all Work on the above Project.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.02

DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

GENERAL INSTRUCTIONS

Section 17076.11 of the Education Code requires school districts using, or planning to use, funds allocated pursuant to the State of California School Facility Program ("Program") for the construction and/or modernization of school buildings to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended each year by the school district on projects that receive state funding. Therefore, the lowest responsive responsible Bidder awarded the Contract must submit this document to the District with its executed Agreement, identifying the steps contractor took to solicit DVBE participation in conjunction with this Contract. **Do not submit this form with your bids.**

PART I – Method of Compliance with DVBE Participation Goals. Check the appropriate box to indicate your method of committing the contract dollar amount.

YOUR BUSINESS ENTERPRISE IS:	**AND YOU WILL**	**AND YOU WILL**
A. ☐ Disabled veteran owned and your forces will perform at least 3% of this Contract	Include a copy of your DVBE letter from Office of Small Business and Disabled Veterans Business Enterprise Services ("OSDS")*	Complete Part 1 of this form and the Certification
B. ☐ Disabled veteran owned but is unable to perform 3% of this Contract with your forces	Use DVBE subcontractors /suppliers to bring the Contract participation to at least 3%	Include a copy of each DVBE's letter from OSDS (including yours, if applicable), and complete Part 1 of this form and the Certification
C. ☐ **NOT** disabled veteran owned	Use DVBE subcontractors /suppliers for at least 3% of this Contract	
D. ☐ Unable to meet the required participation goals	Complete all of this form and the Certification	

* A DVBE letter from OSDS is obtained from the participating DVBE.

You must complete the following table to show the dollar amount of DVBE participation:

	TOTAL CONTRACT PRICE
A. Prime Bidder, if DVBE (own participation)	$
B. DVBE Subcontractor or Supplier	
1.	
2.	
3.	
4.	
C. Subtotal (A & B)	
D. Non-DVBE	
E. Total Bid	

PART II – Contacts. To identify DVBE subcontractors/suppliers for participation in your contract, you must contact each of the following categories. You should contact several DVBE organizations.

CATEGORY	**TELEPHONE NUMBER**	**DATE CONTACTED**	**PERSON CONTACTED**
1. The District, if any			*
2. OSDS, provides assistance locating DVBEs at https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx	(916) 375-4940		*
3. DVBE Organization (List)			*

*Write "recorded message" in this column, if applicable.

PART III – Advertisement. You must advertise for DVBE participation in both a trade and focus paper. List the advertisement you place to solicit DVBE participation. Advertisements should be published at least fourteen (14) days prior to bid/proposal opening; if you cannot advertise fourteen (14) days prior, advertisements should be published as soon as possible. Advertisements must include that your firm is seeking DVBE participation, the project name and location, and your firm's name, your contact person, and telephone number. Attach copies of advertisements to this form.

FOCUS/TRADE PAPER NAME	**CHECK ONE**		**DATE OF ADVERTISEMENT**
	TRADE	**FOCUS**	

PART IV – DVBE Solicitations. List DVBE subcontractors/suppliers that were invited to bid. Use the following instructions to complete the remainder of this section (read the three columns as a sentence from left to right). If you need additional space to list DVBE solicitations, please use a separate page and attach to this form.

IF THE DVBE…..	**THEN…..**	**AND…..**
was selected to participate	Check "YES" in the "SELECTED" column	include a copy of their DVBE letter(s) from OSDS
was **NOT** selected to participate	Check "NO" in the "SELECTED" column	state why in the "REASON NOT SELECTED" column
did not respond to your solicitation	Check the "NO RESPONSE" column.	

DVBE CONTACTED	**SELECTED**		**REASON NOT SELECTED**	**NO RESPONSE**
	YES	**NO**		

A copy of this form must be retained by you and may be subject to a future audit.

CERTIFICATION

I, _____, certify that I am the bidder's _____ and that I have made a diligent effort to ascertain the facts with regard to the representations made herein. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.03

DRUG-FREE WORKPLACE CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

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

The District is not a "state agency" as defined in the applicable section(s) of the Government Code, but the District is a local agency and public school district under California law and requires all contractors on District projects to comply with the provisions and requirements of the Drug-Free Workplace Act of 1990.

Contractor must also comply with the provisions of Health & Safety Code section 11362.3 which prohibits the consumption or possession of cannabis or cannabis products in any public place, including school grounds, and specifically on school grounds while children are present.

Contractor shall certify that it will provide a drug-free workplace by doing all of the following:

a. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the person's or organization's workplace and specifying actions which will be taken against employees for violations of the prohibition.

b. Establishing a drug-free awareness program to inform employees about all of the following:

   (1) The dangers of drug abuse in the workplace.

   (2) The person's or organization's policy of maintaining a drug-free workplace.

   (3) The availability of drug counseling, rehabilitation, and employee-assistance programs.

   (4) The penalties that may be imposed upon employees for drug abuse violations.

c. Requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required above, and that, as a

condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.

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

I also understand that if the District determines that I have either (a) made a false certification herein, or (b) violated this certification by failing to carry out the requirements of section 8355, that the Contract awarded herein is subject to termination, suspension of payments, or both. I further understand that, should I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of the aforementioned Act.

I acknowledge that I am aware of the provisions of and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990 and Health and Safety Code section 11362.3.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.04

TOBACCO-FREE ENVIRONMENT CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This Tobacco-Free Environment Certification form is required from the successful Bidder.

Pursuant to, without limitation, 20 U.S.C. section 6083, Labor Code section 6400 et seq., Health & Safety Code section 104350 et seq.,Business and Professions Code section 22950 et seq., and District Board policies, all District sites, including the Project site, are tobacco-free environments. Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. The prohibition on smoking includes the use of any electronic smoking device that creates an aerosol or vapor, in any manner or in any form, and the use of any oral smoking device for the purpose of circumventing the prohibition of tobacco smoking. Further, Health & Safety Code section 11362.3 prohibits the smoking or use of cannabis or cannabis products in any place where smoking tobacco is prohibited.

I acknowledge that I am aware of the District's policy regarding tobacco-free environments at District sites, including the Project site and hereby certify that I will adhere to the requirements of that policy and not permit any of my firm's employees, agents, subcontractors, or my firm's subcontractors' employees or agents, to use tobacco and/or smoke on the Project site.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.05

HAZARDOUS MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

1. Contractor hereby certifies that no asbestos, or asbestos-containing materials, polychlorinated biphenyl (PCB), or any material listed by the federal or state Environmental Protection Agency or federal or state health agencies as a hazardous material, or any other material defined as being hazardous under federal or state laws, rules, or regulations, ("New Hazardous Material"), shall be furnished, installed, or incorporated in any way into the Project or in any tools, devices, clothing, or equipment used to affect any portion of Contractor's work on the Project for District.

2. Contractor further certifies that it has instructed its employees with respect to the above-mentioned standards, hazards, risks, and liabilities.

3. Asbestos and/or asbestos-containing material shall be defined as all items containing but not limited to chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite. Any or all material containing greater than one-tenth of one percent (0.1%) asbestos shall be defined as asbestos-containing material.

4. Any disputes involving the question of whether or not material is New Hazardous Material shall be settled by electron microscopy or other appropriate and recognized testing procedure, at the District's determination. The costs of any such tests shall be paid by Contractor if the material is found to be New Hazardous Material.

5. All Work or materials found to be New Hazardous Material or Work or material installed with equipment containing New Hazardous Material will be immediately rejected and this Work will be removed at Contractor's expense at no additional cost to the District.

6. Contractor has read and understood the document titled Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.06

LEAD-BASED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

(1) Contractor's work may disturb lead-containing building materials.

(2) Contractor shall notify the District if any work may result in the disturbance of lead-containing building materials.

(3) Contractor shall comply with the Renovation, Repair and Painting Rule, if lead-based paint is disturbed in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

1. Lead as a Health Hazard

Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure, much lower than previously believed, lead can impair the development of a child's central nervous system, causing learning disabilities, and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburses when paint chips, chalks, peels, wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child's hands and toys and then into a child's mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.

Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.

Because the Contractor and its employees will be providing services for the District, and because the Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.

2. Overview of California Law

Education Code section 32240 et seq. is known as the Lead-Safe Schools Protection Act. Under this act, the Department of Health Services is to conduct a sample survey of schools in the State of California for the purpose of developing risk factors to predict lead contamination in public schools. (Ed. Code, § 32241.)

Any school that undertakes any action to abate existing risk factors for lead is required to utilize trained and state-certified contractors, inspectors, and workers. (Ed. Code, § 32243, subd. (b).) Moreover, lead-based paint, lead plumbing, and solders, or other potential sources of lead contamination, shall not be utilized in the construction of any new school facility or the modernization or renovation of any existing school facility. (Ed. Code, § 32244.)

Both the Federal Occupational Safety and Health Administration ("Fed/OSHA") and the California Division of Occupational Safety and Health ("Cal/OSHA") have implemented safety orders applicable to all construction work where a contractor's employee may be occupationally exposed to lead.

The OSHA Regulations apply to all construction work where a contractor's employee may be occupationally exposed to lead. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to those regulations. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. Regulated work includes, but is not limited to, the following:

a. Demolition or salvage of structures where lead or materials containing lead are present;

b. Removal or encapsulation of materials containing lead;

c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;

d. Installation of products containing lead;

e. Lead contamination/emergency cleanup;

f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed; and

g. Maintenance operations associated with the construction activities described in the subsection.

Because it is assumed by the District that all painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that the Contractor, its workers and subcontractors fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials (including title 8, California Code of Regulations, section 1532.1).

Contractor shall notify the District if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the District. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.

3. Renovation, Repair and Painting Rule, Section 402(c)(3) of the Toxic Substances Control Act

The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).

The RRP requirements apply to all contractors who disturb lead-based paint in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a home constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

4. Contractor's Liability

If the Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, the Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

It shall be the responsibility of the Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of the Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any school site within the District.

The Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of the Contractor.

THE CONTRACTOR HEREBY ACKNOWLEDGES, UNDER PENALTY OF PERJURY, THAT IT:

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON THE OWNER'S PROPERTY;

2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL, OF LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.07

IMPORTED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This form shall be executed by all entities that, in any way, provide or deliver and/or supply any soils, aggregate, or related materials ("Fill") to the Project Site and shall be provided to the District at least ten (10) days before delivery. All Fill shall satisfy all requirements of any environmental review of the Project performed pursuant to the statutes and guidelines of the California Environmental Quality Act, section 21000 et seq. of the Public Resources Code ("CEQA"), and all requirements of section 17210 et seq. of the Education Code, including requirements for a Phase I environmental assessment acceptable to the State of California Department of Education and Department of Toxic Substances Control.

Certification of:
- □ Delivery Firm/Transporter
- □ Supplier
- □ Manufacturer
- □ Wholesaler
- □ Broker
- □ Retailer
- □ Distributor
- □ Other _____

Type of Entity
- □ Corporation
- □ General Partnership
- □ Limited Partnership
- □ Limited Liability Company
- □ Sole Proprietorship
- □ Other _____

Name of firm ("Firm"): _____

Mailing address: _____

Addresses of branch office used for this Project: _____

If subsidiary, name and address of parent company: _____

_____

By my signature below, I hereby certify that I am aware of section 25260 of the Health and Safety Code and the sections referenced therein regarding the definition of hazardous material. I further certify on behalf of the Firm that all soils, aggregates, or related materials provided, delivered, and/or supplied or that will be provided, delivered, and/or supplied by this Firm to the Project Site are free of any and all hazardous material as defined in section 25260 of the Health and Safety Code. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: _____

Proper Name of Firm: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.08

CRIMINAL BACKGROUND INVESTIGATION /FINGERPRINTING CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

The undersigned does hereby certify to the governing board of the District as follows:

That I am a representative of the Contractor currently under contract with the District; that I am familiar with the facts herein certified; and that I am authorized and qualified to execute this certificate on behalf of Contractor.

Contractor certifies that it has taken at least one of the following actions with respect to the construction Project that is the subject of the Contract (check all that apply):

☐ The Contractor is a sole proprietor and intends to comply with the fingerprinting requirements of Education Code section 45125.1(k) with respect to all Contractor's employees who may have contact with District pupils in the course of providing services pursuant to the Contract, and hereby agrees to the District's preparation and submission of fingerprints such that the California Department of Justice may determine that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. No work shall commence until such determination by DOJ has been made.

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District and undertake to prepare and submit Contractor's fingerprints as if he or she was an employee of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

☐ The Contractor, who is not a sole proprietor, has complied with the fingerprinting requirements of Education Code section 45125.1 with respect to all Contractor's employees and all of its Subcontractors' employees who may have contact with District pupils in the course of providing services pursuant to the Contract, and the California Department of Justice has determined that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. A complete and accurate list of Contractor's employees and of all of its subcontractors' employees who may come in contact with District pupils during the course and scope of the Contract is attached hereto; and/or

☐ Pursuant to Education Code section 45125.2, Contractor has installed or will install, prior to commencement of Work, a physical barrier at the Work Site, that will limit contact between Contractor's employees and District pupils at all times; and/or

☐ Pursuant to Education Code section 45125.2, Contractor certifies that all employees will be under the continual supervision of, and monitored by, an employee of the Contractor who the California Department of Justice has ascertained, or as described below, will ascertain, has not been convicted of a violent or serious felony. The name and title of the employee who will be supervising Contractor's and its subcontractors' employees is:

Name: _____

Title: _____

NOTE: If the Contractor is a sole proprietor, and elects the above option, Contractor must have the above-named employee's fingerprints prepared and submitted by the District, in accordance with Education Code section 45125.1(k). No work shall commence until such determination by DOJ has been made.

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District and undertake to prepare and submit Contractor's fingerprints as if he or she was an employee of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

☐ *The Work on the Contract is either (i) at an unoccupied school site and no employee and/or subcontractor or supplier of any tier of the Contract shall come in contact with the District pupils or (ii) Contractor's employees or any subcontractor or supplier of any tier of the Contract will have only limited contact, if any, with District pupils and the District will take appropriate steps to protect the safety of any pupils that may come in contact with Consultant's employees, subcontractors or suppliers so that the fingerprinting and criminal background investigation requirements of Education Code section 45125.1 shall not apply to Contractor under the Contract.*

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

Contractor's responsibility for background clearance extends to all of its employees, Subcontractors, and employees of Subcontractors coming into contact with District pupils regardless of whether they are designated as employees or acting as independent contractors of the Contractor.

Date: _____
Proper Name of Contractor: _____
Signature: _____
Print Name: _____
Title: _____

DOCUMENT 00 45 46.09

BUY AMERICAN CERTIFICATION

PROJECT/CONTRACT NO.: 0949-8429-440-15 between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Federal regulations require that all of the iron, steel, and manufactured goods used in projects for the construction, installation, repairs, renovation, modernization, or maintenance of a public building or public work funded in part or in whole by federal stimulus funds, with the exception of projects funded by Qualified School Construction Bonds, be produced in the United States of America, unless a federal department waives this requirement because (1) it is inconsistent with the public interest, (2) the goods are not produced in sufficient quantities or of satisfactory quality in the United States, or (3) the requirement would increase the cost of the Project overall by more than twenty-five percent (25%) ("Buy American").

Contractor shall submit this Certification with its executed agreement, identifying the steps Contractor will take to use goods produced in the United States of America in carrying out this Contract. Bidder should not submit this form with its bid.

Contractor shall retain a copy of this form and may be subject to a future audit.

CERTIFICATION

On behalf of Contractor, I represent and covenant that Contractor will use on the Project only iron, steel and manufactured goods produced in the United States of America except goods for which a federal department has waived this requirement.

I, _____, certify that I am the Contractor's _____ _____ and that the representations and covenants made herein are true and correct. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.10

ROOFING PROJECT CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Lodi Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This form shall be executed by all contractors, materials manufacturers, or vendors involved in a bid or proposal for the repair or replacement of a roof of a public school building where the project is either for repair of more than 25% of the roof or that has a total cost more than $21,000 ("roofing project") and submitted to the District when the award is made.

Certification of: □ Contractor □ Materials Manufacturer
□ Vendor □ Other _____

I, _____, _____, certify that I have not
[Name] [Name of Firm]
offered, given, or agreed to give, received, accepted, or agreed to accept, any gift, contribution, or any financial incentive whatsoever to or from any person in connection with the roofing project contract. As used in this certification, "person" means any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Furthermore, I, _____, _____, certify that
[Name] [Name of Firm]
I do not have, and throughout the duration of the contract, I will not have, any financial relationship in connection with the performance of this contract with any architect, engineer, roofing consultant, materials manufacturer, distributor, or vendor that is not disclosed below.

I, _____, _____, have the following
[Name] [Name of Firm]
financial relationships with an architect, engineer, roofing consultant, materials manufacturer, distributor, or vendor, or other person in connection with the following roofing project contract (provide Name and Address of Building, and Contract Date and Number):

_____

_____

_____

_____

_____

_____

_____

By my signature below, I hereby certify that, to the best of my knowledge, the contents of this disclosure are true, or are believed to be true. I further certify on behalf of the Firm that I am aware of section 3000 et seq. of the California Public Contract Code, and the sections referenced therein regarding the penalties for providing false information or failing to disclose a financial relationship in this disclosure. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: _____

Proper Name of Firm: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 49

REGISTERED SUBCONTRACTORS LIST
(Labor Code Section 1771.1)

PROJECT: Modernization Lodi Middle School

Date Submitted (for Updates): _____

Contractor acknowledges and agrees that it must clearly set forth below the name and Department of Industrial Relations (DIR) registration number of each subcontractor **for all tiers** who will perform work or labor or render service to Contractor or its subcontractors in or about the construction of the Work **at least two (2) weeks before the subcontractor is scheduled to perform work**. This document is to be updated as all tiers of subcontractors are identified.

Contractor acknowledges and agrees that, if Contractor fails to list as to any subcontractor of any tier who performs any portion of Work, the Contract is subject to cancellation and the Contractor will be subjected to penalty under applicable law.

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

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Subcontractor Name: _____

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Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Date: _____

Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 90

POST BID INTERVIEW

PART 1 – GENERAL

1.01 SUMMARY

If requested by the District, this Section requires the apparent low bidder to attend and participate in a Post Bid Interview with the Construction Manager, prior to award of any contract by the District. The Post Bid Interview will be scheduled by the Construction Manager within three (3) calendar days after the date of bid.

1.02 REQUIRED ATTENDANCE

A. A duly authorized representative of the apparent low bidder is required to attend the Post Bid Interview, in person.

B. The apparent low bidder's authorized representative(s) must have (1) knowledge of how the bid submitted was prepared, (2) the person responsible for supervising performance of the Work, and (3) the authority to bind the apparent low bidder.

C. Failure to attend the Post Bid Interview as scheduled will be considered just cause for the District to reject the Bid as nonresponsive.

1.03 POST BID INTERVIEW PROCEDURE

A. The Construction Manager will review the Bid with the attendees.

B. The Construction Manager will review the Contract Documents with the attendees, including but not limited to:

(1) Insurance

(2) Bonding

(3) Addenda

(4) Pre-Bid Clarifications

(5) Scope of Work

(6) Bid Packages Descriptions

(7) Bid Alternates

(8) Contract Plans

(9) Contract Specifications

(10) Project Schedule and Schedule Requirements

(11) Critical Dates Requirement for Other Bid Packages

(12) Prevailing Wage Requirements

(13) Liquidated Damages

(14) Required Documentation for Contract Administration

(15) Contract Coordination Requirements

1.04 POST BID INTERVIEW DOCUMENTATION

The Construction Manager will document the Post Bid Interview on the form attached to this Section. Both the apparent low bidder and the Construction Manager are required to sign the Post Bid Interview Documentation.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

POST BID INTERVIEW

CONSTRUCTION MANAGER

[Name]
[Address 1]
[Address 2]
[Phone] [Fax]

BIDDER: _____

DATE: _____ TIME: _____ PHONE: _____

I. INTRODUCTIONS:

A. Present

_____ CONTRACTOR	_____ CONTRACTOR
_____	_____
_____ [CM]	_____ [CM]

II. PROPOSED CONTRACT:

III. PURPOSE OF INTERVIEW IS TO ASSURE A MUTUAL UNDERSTANDING OF THE FOLLOWING:

A.	Do you acknowledge submission of a complete and accurate bid?	Yes	No
B.	Do you acknowledge the Bid Document submittal timelines after NOA and NTP and can you meet those timelines?	Yes	No
C.	Do you acknowledge the requirements for the escrow of bid documents?	Yes	No
D.	Are you comfortable with your listed subcontractors?	Yes	No

IV. CONTRACTUAL REQUIREMENTS:

A.	Do you understand you are a prime contractor?	Yes	No
B.	Can you meet specified insurance requirements?	Yes	No
1.	Do any of your policies that require Additional Insured endorsements exceed the minimum coverage requirements?	Yes	No
2.	Are you requesting that the District accept an Excess Liability Insurance Policy to meet the policy limit?	Yes	No
3.	Will there be a gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella or Excess Liability Insurance Policy?	Yes	No

C. Will you provide the Performance Bond and Labor and Material Bond for 100% of the Contract Price as stipulated? Yes No

1. Cost for bonds: _____% Yes No

2. Is the cost of your bonds in your base bid? Yes No

3. Is your surety licensed to issue bonds in California? Yes No

D. Do you understand the fingerprinting requirements? Yes No

E. Is it understood that all workers must be paid prevailing wage? Yes No

F. Is it understood that all subcontractors of every tier must be registered as a public works contractor with the Department of Industrial Relations? Yes No

V. SCOPE OF WORK:

A. Acknowledged Receipt of Addenda #1-__ Yes No

B. Are the costs for addenda items included in your bid? (if applicable) Yes No

C. Do you have a complete understanding of your Scope of Work under the proposed Agreement? Yes No

D. You have re-reviewed the documents and understand the Scope of the Work. Are there any items that require clarification? Yes No

If yes, please identify them.

1. _____

_____

2. _____

_____

3. _____

_____

Is (are) there additional cost(s) for the above item(s)? Yes No

E. Is the cost for allowance included in your bid? Yes No

F. Have you reviewed bid alternative(s) #1-___? (if applicable) Yes No

G. Are the costs for bid alternatives included in your bid? Yes No

H. Are the plans and specifications clear and understandable to your satisfaction? Yes No

I. Do you acknowledge that the time to submit notice of requests for substitution of specified materials has expired? Yes No

VI. SCHEDULE:

A. Do you acknowledge and agree to the stipulated completion dates and milestones in the contract? Yes No

1. Will you provide a detailed construction schedule to _____ within the required ten (10) days of the Notice to Proceed, per the contract? Yes No

2. Can you meet the submittal deadline? Yes No

3. It is understood that the Project schedule is critical and that that weekend and overtime work may be required to meet the milestones. Yes No

4. It is understood that if rain does occur, then all dewatering and protection of work is required, per the contract. Yes No
If not, what do you believe must change and why? _____

_____

_____

B. Identify critical materials, deliveries, long lead items and other dependencies, including Owner Furnished items that could affect the completion of your work. Yes No

1. _____
2. _____
3. _____
4. _____
5. _____

C. Do you understand that there is going to be maintenance and other construction taking place on site during the course of the project? Yes No

VII. EXECUTION OF WORK

A. Do you understand the access to the site? Yes No

B. Do you understand the staging area restrictions? Yes No

C. Have you included protection of [asphalt, floors, and roofs]? Yes No

D. Do you understand that the site is occupied by students, teachers, administrators, parents, etc.? Yes No

VIII. CONTRACTOR COMMENTS/SUGGESTIONS:

1. _____

2. _____

3. _____

4. _____

5. _____

IX. CONTRACTOR

You agree the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all Work in the Contract Documents, and that costs for all Work are included in your bid.

The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

[Company Name]

_____

Signature _____ Title: _____

Date: _____

X. CONSTRUCTION MANAGER

Signature _____ Title: _____

Date: _____

Title of Document: POST BID INTERVIEW
Number of Pages: _____
Date of Document: _____

END OF DOCUMENT

DOCUMENT 00 51 00

NOTICE OF AWARD

Dated: _____ 20__

To: _____ (Contractor)

To: _____
(Address)

From: Governing Board ("Board") of the Lodi Unified School District ("District")

Re: _____, Project No. _____ ("Project").

Contractor has been awarded the Contract for the above-referenced Project on _____ _____, 20__, by action of the District's Board.

The Contract Price is _____ Dollars ($_____), and includes alternates _____.

Three (3) copies of each of the Contract Documents (except Drawings) accompany this Notice of Award. Three (3) sets of the Drawings will be delivered separately or otherwise made available. Additional copies are available at cost of reproduction.

You must comply with the following conditions precedent within **SEVEN (7)** calendar days of the date of this Notice of Award.

The Contractor shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award.

a. Agreement: To be executed by successful Bidder. Submit three (3) copies, each bearing an original signature.

b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.

c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

d. Payment Bond (Contractor's Labor & Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

e. Insurance Certificates and Endorsements as required.

f. Workers' Compensation Certification.

g. Prevailing Wage and Related Labor Requirements Certification.

h. Disabled Veteran Business Enterprise Participation Certification.

i. Drug-Free Workplace Certification.

j. Tobacco-Free Environment Certification.

k. Hazardous Materials Certification.

l. Lead-Based Materials Certification.

m. Imported Materials Certification.

n. Criminal Background Investigation/Fingerprinting Certification.

o. Buy American Certification.

p. Roofing Project Certification: from Contractor, Material Manufacturer and/or Vendor.

Failure to comply with these conditions within the time specified will entitle District to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited, as well as any other rights the District may have against the Contractor.

After you comply with those conditions, District will return to you one fully signed counterpart of the Agreement.

LODI UNIFIED SCHOOL DISTRICT

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 52 13

AGREEMENT

THIS AGREEMENT IS MADE AND ENTERED INTO THIS _____ DAY OF _____ _____, 20___, by and between the Lodi Unified School District ("District") and _____ _____ ("Contractor") ("Agreement").

WITNESSETH: That the parties hereto have mutually covenanted and agreed, and by these presents do covenant and agree with each other, as follows:

1. The Work: Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, and material necessary to perform and complete in a good and workmanlike manner, the work of the following project:

_____

("Project" or "Contract" or "Work")

It is understood and agreed that the Work shall be performed and completed as required in the Contract Documents including, without limitation, the Drawings and Specifications and submission of all documents required to secure funding or by the Division of the State Architect for close-out of the Project, under the direction and supervision of, and subject to the approval of, the District or its authorized representative.

2. The Contract Documents: The complete Contract consists of all Contract Documents as defined in the General Conditions and incorporated herein by this reference. Any and all obligations of the District and Contractor are fully set forth and described in the Contract Documents. All Contract Documents are intended to cooperate so that any Work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all Contract Documents.

3. Interpretation of Contract Documents: Should any question arise concerning the intent or meaning of Contract Documents, including the Drawings or Specifications, the question shall be submitted to the District for interpretation. If a conflict exists in the Contract Documents, valid, written modifications, beginning with the most recent, shall control over this Agreement (if any), which shall control over the Special Conditions, which shall control over any Supplemental Conditions, which shall control over the General Conditions, which shall control over the remaining Division 0 documents, which shall control over Division 1 Documents which shall control over Division 2 through Division 49 documents, which shall control over figured dimensions, which shall control over large-scale drawings, which shall control over small-scale drawings. In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the District in the matter shall be final.

4. Time for Completion: It is hereby understood and agreed that the Work under this Contract shall be completed within _____ (____) consecutive calendar days ("Contract Time") from the date specified in the District's Notice to Proceed.

5. **Completion - Extension of Time**: Should the Contractor fail to complete this Contract, and the Work provided herein, within the time fixed for completion, due allowance being made for the contingencies provided for herein, the Contractor shall become liable to the District for all loss and damage that the District may suffer on account thereof. The Contractor shall coordinate its Work with the Work of all other contractors. The District shall not be liable for delays resulting from Contractor's failure to coordinate its Work with other contractors in a manner that will allow timely completion of Contractor's Work. Contractor shall be liable for delays to other contractors caused by Contractor's failure to coordinate its Work with the Work of other contractors.

6. **Liquidated Damages**: Time is of the essence for all work under this Agreement. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the District will sustain in the event of and by reason of Contractor's delay; therefore, Contractor agrees that it shall pay to the District the sum of _____ dollars ($_____) per day as liquidated damages for each and every day's delay beyond the time herein prescribed in finishing the Work.

It is hereby understood and agreed that this amount is not a penalty.

In the event that any portion of the liquidated damages is not paid to the District, the District may deduct that amount from any money due or that may become due the Contractor under this Agreement, and such deduction does not constitute a withholding or penalty. The District's right to assess liquidated damages is as indicated herein and in the General Conditions.

The time during which the Contract is delayed for cause, as hereinafter specified, may extend the time of completion for a reasonable time as the District may grant, provided that Contractor has complied with the claims procedure of the Contract Documents. This provision does not exclude the recovery of damages by either party under other provisions in the Contract Documents.

7. **Loss Or Damage**: The District and its agents and authorized representatives shall not in any way or manner be answerable or suffer loss, damage, expense, or liability for any loss or damage that may happen to the Work, or any part thereof, or in or about the same during its construction and before acceptance, and the Contractor shall assume all liabilities of every kind or nature arising from the Work, either by accident, negligence, theft, vandalism, or any cause whatsoever; and shall hold the District and its agents and authorized representatives harmless from all liability of every kind and nature arising from accident, negligence, or any cause whatsoever.

8. **Insurance and Bonds**: Prior to issuance of the Notice to Proceed by the District, Contractor shall provide all required certificates of insurance, insurance endorsements, and payment and performance bonds as evidence thereof.

9. **Prosecution of Work**: If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this Contract, the District, may, pursuant to the General Conditions and without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

10. **Authority of Architect, Project Inspector, and DSA**: Contractor hereby acknowledges that the Architect(s), the Project Inspector(s), and the Division of the State Architect ("DSA") have authority to approve and/or suspend Work if the Contractor's Work does not comply with the requirements of the Contract Documents, Title 24 of the California Code of Regulations, and all applicable laws and regulations. The Contractor shall be liable for any delay caused by its non-compliant Work.

11. **Assignment of Contract**: Neither the Contract, nor any part thereof, nor any moneys due or to become due thereunder, may be assigned by the Contractor without the prior written approval of the District, nor without the written consent of the Surety on the Contractor's Performance Bond (the "Surety"), unless the Surety has waived in writing its right to notice of assignment.

12. **Classification of Contractor's License**: Contractor hereby acknowledges that it currently holds valid Type _____ Contractor's license(s) issued by the State of California, Contractors' State License Board, in accordance with division 3, chapter 9, of the Business and Professions Code and in the classification called for in the Contract Documents.

13. **Registration as Public Works Contractor**: The Contractor and all Subcontractors currently are registered as public works contractors with the Department of Industrial Relations, State of California, in accordance with Labor Code section 1771.1.

14. **Payment of Prevailing Wages**: The Contractor and all Subcontractors shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. The Contractor and all Subcontractors shall comply with the Davis Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. If a conflict exists, the more stringent provision shall control over this Agreement.

15. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and Title 8 of the California Code of Regulations. Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code, including, without limitation, the requirement that the Contractor and all of its Subcontractors shall timely submit complete and accurate electronic certified payroll records as required by the Contract Documents, or the District may not issue payment.

16. **Contract Price**: In consideration of the foregoing covenants, promises, and agreements on the part of the Contractor, and the strict and literal fulfillment of each and every covenant, promise, and agreement, and as compensation agreed upon for the Work and construction, erection, and completion as aforesaid, the District covenants, promises, and agrees that it will well and truly pay and cause to be paid to the Contractor in full, and as the full Contract Price and compensation for

construction, erection, and completion of the Work hereinabove agreed to be performed by the Contractor, the following price:

_____ **Dollars**

($_____),

in lawful money of the United States, which sum is to be paid according to the schedule provided by the Contractor and accepted by the District and subject to additions and deductions as provided in the Contract. This amount supersedes any previously stated and/or agreed to amount(s).

17. **No Representations:** No representations have been made other than as set forth in writing in the Contract Documents, including this Agreement. Each of the Parties to this Agreement warrants that it has carefully read and understood the terms and conditions of this Agreement and all Contract Documents, and that it has not relied upon the representations or advice of any other Party or any attorney not its own.

18. **Entire Agreement:** The Contract Documents, including this Agreement, set forth the entire agreement between the parties hereto and fully supersede any and all prior agreements, understandings, written or oral, between the parties hereto pertaining to the subject matter thereof.

19. **Severability**: If any term, covenant, condition, or provision in any of the Contract Documents is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions in the Contract Documents shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.

IN WITNESS WHEREOF, accepted and agreed on the date indicated above:

CONTRACTOR	**LODI UNIFIED SCHOOL DISTRICT**
_____	_____
By: _____	By: _____
Title: _____	Title: _____

NOTE: If the party executing this Contract is a corporation, a certified copy of the by-laws, or of the resolution of the Board of Directors, authorizing the officers of said corporation to execute the Contract and the bonds required thereby must be attached hereto.

END OF DOCUMENT

DOCUMENT 00 55 00

NOTICE TO PROCEED

Dated: _____, 20___

TO: _____
("Contractor")

ADDRESS: _____

PROJECT:_____

PROJECT/CONTRACT NO.: _____ between the Lodi Unified School District and Contractor ("Contract").

You are notified that the Contract Time under the above Contract will commence to run on _____, 20___. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement executed by Contractor, the date of completion is _____, 20___.

You must submit the following documents by 5:00 p.m. of the TENTH (10th) calendar day following the date of this Notice to Proceed:

a. Contractor's preliminary schedule of construction.

b. Contractor's preliminary schedule of values for all of the Work.

c. Contractor's preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals

d. Contractor's Safety Plan specifically adapted for the Project.

e. Registered Subcontractors List: A complete subcontractors list for all tiers, including the name, address, telephone number, email address, facsimile number, California State Contractors License number, license classification, Department of Industrial Relations registration number, and monetary value of all Subcontracts.

Thank you. We look forward to a very successful Project.

LODI UNIFIED SCHOOL DISTRICT

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 56 00

ESCROW BID DOCUMENTATION

1. Requirement to Escrow Bid Documentation

a. Contractor shall submit, within **SEVEN (7)** calendar days after the date of the Notice of Award, one copy of all documentary information received or generated by Contractor in preparation of bid prices for this Contract, as specified herein. This material is referred to herein as "Escrow Bid Documentation." The Escrow Bid Documentation of the Contractor will be held in escrow for the duration of the Contract.

b. Contractor agrees, as a condition of award of the Contract, that the Escrow Bid Documentation constitutes all written information used in the preparation of its bid, and that no other written bid preparation information shall be considered in resolving disputes or claims. Contractor also agrees that nothing in the Escrow Bid Documentation shall change or modify the terms or conditions of the Contract Documents.

c. The Escrow Bid Documentation will not be opened by District except as indicated herein. The Escrow Bid Documentation will be used only for the resolution of change orders and claims disputes.

d. Contractor's submission of the Escrow Bid Documentation, as with the bonds and insurance documents required, is considered an essential part of the Contract award. Should the Contractor fail to make the submission within the allowed time specified above, District may deem the Contractor to have failed to enter into the Contract, and the Contractor shall forfeit the amount of its bid security, accompanying the Contractor's bid, and District may award the Contract to the next lowest responsive responsible bidder.

e. NO PAYMENTS WILL BE MADE, NOR WILL DISTRICT ACCEPT PROPOSED CHANGE ORDERS UNTIL THE ABOVE REQUIRED INFORMATION IS SUBMITTED AND APPROVED.

f. The Escrow Bid Documentation shall be submitted in person by an authorized representative of the Contractor to the District.

2. Ownership of Escrow Bid Documentation

a. The Escrow Bid Documentation is, and shall always remain, the property of Contractor, subject to review by District, as provided herein.

b. Escrow Bid Documentation constitute trade secrets, not known outside Contractor's business, known only to a limited extent and only by a limited number of employees of Contractor, safeguarded while in Contractor's possession, extremely valuable to Contractor, and could be extremely valuable to Contractor's competitors by virtue of reflecting Contractor's contemplated techniques of construction. Subject to the provisions herein, District agrees to safeguard the Escrow Bid Documentation, and all

information contained therein, against disclosure to the fullest extent permitted by law.

3. Format and Contents of Escrow Bid Documentation

a. Contractor may submit Escrow Bid Documentation in its usual cost-estimating format; a standard format is not required. The Escrow Bid Documentation shall be submitted in the language (e.g., English) of the specification.

b. Escrow Bid Documentation must clearly itemize the estimated costs of performing the work of each bid item contained in the bid schedule, separating bid items into sub-items as required to present a detailed cost estimate and allow a detailed cost review. The Escrow Bid Documentation shall include all subcontractor bids or quotes, supplier bids or quotes, quantity takeoffs, crews, equipment, calculations of rates of production and progress, copies of quotes from subcontractors and suppliers, and memoranda, narratives, add/deduct sheets, and all other information used by the Contractor to arrive at the prices contained in the bid proposal. Estimated costs should be broken down into Contractor's usual estimate categories such as direct labor, repair labor, equipment ownership and operation, expendable materials, permanent materials, and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Contractor's usual format. The Contractor's allocation of indirect costs, contingencies, markup, and other items to each bid item shall be identified.

c. All costs shall be identified. For bid items amounting to less than $10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and markup, as applicable, are allocated.

d. Bid Documentation provided by District should not be included in the Escrow Bid Documentation unless needed to comply with the following requirements.

4. Submittal of Escrow Bid Documentation

a. The Escrow Bid Documentation shall be submitted by the Contractor in a sealed container within **SEVEN (7)** calendar days after the date of the Notice of Award. The container shall be clearly marked on the outside with the Contractor's name, date of submittal, project name and the words "Escrow Bid Documentation – Intended to be opened in the presence of Authorized Representatives of Both District and Contractor".

b. By submitting Escrow Bid Documentation, Contractor represents that the material in the Escrow Bid Documentation constitutes all the documentary information used in preparation of the bid and that the Contractor has personally examined the contents of the Escrow Bid Documentation container and has found that the documents in the container are complete.

c. If Contractor's proposal is based upon subcontracting any part of the work, each subcontractor whose total subcontract price exceeds 5 percent of the total contract price proposed by Contractor, shall provide separate Escrow Documents to be included with those of Contractor. Those documents shall be opened and examined in the same manner and at the same time as the examination described above for Contractor.

d. If Contractor wishes to subcontract any portion of the Work after award, District retains the right to require Contractor to submit Escrow Documents for the Subcontractor before the subcontract is approved.

5. Storage, Examination and Final Disposition of Escrow Bid Documentation

a. The Escrow Bid Documentation will be placed in escrow, for the life of the Contract, in a mutually agreeable institution. The cost of storage will be paid by Contractor for the duration of the project until final Contract payment. The storage facilities shall be the appropriate size for all the Escrow Bid Documentation and located conveniently to both District's and Contractor's offices.

b. The Escrow Bid Documentation shall be examined by both District and Contractor, at any time deemed necessary by either District or Contractor, to assist in the negotiation of price adjustments and change orders or the settlement of disputes and claims. In the case of legal proceedings, Escrow Bid Documentation shall be used subject to the terms of an appropriate protective order if requested by Contractor and ordered by a court of competent jurisdiction. Examination of the Escrow Bid Documentation is subject to the following conditions:

(1) As trade secrets, the Escrow Bid Documentation is proprietary and confidential to the extent allowed by law.

(2) District and Contractor shall each designate, in writing to the other party **SEVEN (7)** calendar days prior to any examination, the names of representatives who are authorized to examine the Escrow Bid Documentation. No other person shall have access to the Escrow Bid Documentation.

(3) Access to the documents may take place only in the presence of duly designated representatives of the District and Contractor. If Contractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days' notice, then the District representative may examine the Escrow Bid Documents alone upon an additional **THREE (3)** calendar days' notice if a representative of the Contractor does not appear at the time set.

(4) If a subcontractor has submitted sealed information to be included in the Escrow Bid Documents, access to those documents may take place only in the presence of a duly designated representative of the District, Contractor and that subcontractor. If that subcontractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days' notice, then the District representative and/or the

Contractor may examine the Escrow Bid Documentation without that subcontractor present upon an additional **THREE (3)** calendar days' notice if a representative of that subcontractor does not appear at the time set.

c. The Escrow Bid Documentation will be returned to Contractor at such time as the Contract has been completed and final settlement has been achieved.

END OF DOCUMENT

DOCUMENT 00 57 00

ESCROW AGREEMENT IN LIEU OF RETENTION
(Public Contact Code Section 22300)

(Note: Contractor must use this form.)

This Escrow Agreement in Lieu of Retention ("Escrow Agreement") is made and entered into this _____ day of _____, 20___, by and between the Lodi Unified School District ("District"), whose address is 1305 E. Vine Street , Lodi , California 95240 , and _____ ("Contractor"), whose address is _____ _____ , and _____ ("Escrow Agent"), a state or federally chartered bank in the state of California, whose address is _____ _____.

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

1. Pursuant to section 22300 of Public Contract Code of the State of California, which is hereby incorporated by reference, Contractor has the following two (2) options:

   ☐ Deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction Contract No.___ entered into between District and Contractor for the _____ _____ Project, in the amount of _____ Dollars ($_____) dated, _____, 20_____, (the "Contract"); **or**

   ☐ On written request of Contractor, District shall make payments of the retention earnings for the above referenced Contract directly to Escrow Agent.

   When Contractor deposits the securities as a substitute for Contract earnings (first option), Escrow Agent shall notify District within ten (10) calendar days of the deposit. The market value of the securities at the time of substitution and at all times from substitution until the termination of the Escrow Agreement shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between District and Contractor.

   Securities shall be held in the name of Lodi Unified School District, and shall designate Contractor as beneficial owner.

2. District shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified above.

3. When District makes payment of retentions earned directly to Escrow Agent, Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the Parties shall be equally applicable and binding when District pays Escrow Agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of District. The District will charge Contractor $_____ for each of District's deposits to the escrow account. These expenses and payment terms shall be determined by District, Contractor, and Escrow Agent.

5. Interest earned on securities or money market accounts held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to District.

6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to Escrow Agent that District consents to withdrawal of amount sought to be withdrawn by Contractor.

7. District shall have the right to draw upon the securities and/or withdraw amounts from the Escrow Account in the event of default by Contractor. Upon seven (7) days' written notice to Escrow Agent from District of the default, if applicable, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by District. Escrow Agent shall not be authorized to determine the validity of any notice of default given by District pursuant to this paragraph, and shall promptly comply with District's instructions to pay over said escrowed assets. Escrow Agent further agrees to not interplead the escrowed assets in response to a conflicting demand.

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

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

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

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

On behalf of District:	On behalf of Contractor:
Title	Title
Name	Name
Signature	Signature
Address	Address

On behalf of Escrow Agent:

Title

Name

Signature

Address

At the time that the Escrow Account is opened, District and Contractor shall deliver to Escrow Agent a fully executed copy of this Agreement.

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

On behalf of District:	On behalf of Contractor:
Title	Title
Name	Name
Signature	Signature
Address	Address

END OF DOCUMENT

DOCUMENT 00 61 13.13

PERFORMANCE BOND
(100% of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the Lodi Unified School District, ("District") and _____ _____ ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

_____

("Project" or "Contract") which Contract dated _____, 20___, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

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

NOW, THEREFORE, the Principal and _____ _____ ("Surety") are held and firmly bound unto the Board of the District in the penal sum of

_____

Dollars ($_____), lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents, to:

- Promptly perform all the work required to complete the Project; and

- Pay to the District all damages the District incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

Or, at the District's sole discretion and election, the Surety shall obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the District of the lowest responsible bidder, arrange for a contract between such bidder and the District and make available as Work progresses sufficient funds to pay the cost of completion less the "balance of the Contract Price," and to pay and perform all obligations of Principals under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of liquidated damages. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable to Principal by the District under the Contract and any modifications thereto, less the amount previously paid by the District to the Principal, less any withholdings by the District allowed under the Contract. District shall not be required or obligated to accept a tender of a completion contractor from the Surety for any or no reason.

The condition of the obligation is such that, if the above bound Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the Contract and any alteration

thereof made as therein provided, on its part to be kept and performed at the time and in the intent and meaning, including all contractual guarantees and warrantees of materials and workmanship, and shall indemnify and save harmless the District, its trustees, officers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

Surety expressly agrees that the District may reject any contractor or subcontractor proposed by Surety to fulfill its obligations in the event of default by the Principal. Surety shall not utilize Principal in completing the Work nor shall Surety accept a Bid from Principal for completion of the Work if the District declares the Principal to be in default and notifies Surety of the District's objection to Principal's further participation in the completion of the Work.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period equal to the warranty and/or guarantee period of the Contract, during which time Surety's obligation shall continue if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the District from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the District's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond. The Surety also stipulates and agrees that it shall not be exonerated or released from the obligation of this bond by any overpayment or underpayment by the District that is based upon estimates approved by the Architect. The Surety does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20___.

Principal	Surety
By	By
	Name of California Agent of Surety
	Address of California Agent of Surety
	Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 61 13.16

PAYMENT BOND
Contractor's Labor & Material Bond
(100% Of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the Lodi Unified School District, ("District") and _____, ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

_____

("Project" or "Contract") which Contract dated _____, 20___, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, pursuant to law and the Contract, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by which the Contract is awarded in an amount equal to one hundred percent (100%) of the Contract price, to secure the claims to which reference is made in sections 9000 through 9510 and 9550 through 9566 of the Civil Code, and division 2, part 7, of the Labor Code.

NOW, THEREFORE, the Principal and _____ _____ ("Surety") are held and firmly bound unto all laborers, material men, and other persons referred to in said statutes in the sum of _____ Dollars ($_____), lawful money of the United States, being a sum not less than the total amount payable by the terms of Contract, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the Principal or any of its subcontractors, or their heirs, executors, administrators, successors, or assigns of any, all, or either of them shall fail to pay for any labor, materials, provisions, or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Principal or any of his or its subcontractors of any tier under Section 13020 of the Unemployment Insurance Code with respect to such work or labor, that the Surety will pay the same in an amount not exceeding the amount herein above set forth, and also in case suit is brought upon this bond, will pay a reasonable attorney's fee to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under section 9100 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void; otherwise it shall be and remain in full force and affect.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of Contract or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20___.

Principal	Surety
By	By
	Name of California Agent of Surety
	Address of California Agent of Surety
	Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 63 40

ALLOWANCE EXPENDITURE DIRECTIVE FORM

Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240

ALLOWANCE EXPENDITURE DIRECTIVE NO.:

ALLOWANCE EXPENDITURE DIRECTIVE

Project: _____ **Date: _____**
DSA File No.:_____
Bid No.: _____ **DSA Appl. No._____**

The following parties agree to the terms of this Allowance Expenditure Directive ("AED"):

Owner Name, Address, Telephone:

_____
_____
_____

Contractor Name, Address, Telephone:

_____
_____
_____

Reference	**Description**	**Allowance Authorized for Expenditure**	**Days Ext.**
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	$	
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	$	
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	$	

Contract time will be adjusted as follows: Previous Completion Date: __[DATE]__	Total Contract Allowance Amount:	$
	Amount of Previously Approved Allowance Expenditure Directive(s):	$

_____[#]_____ Calendar Days Extension (zero days unless otherwise indicated) Current Completion Date: __[DATE]__	Amount of this Allowance Expenditure Directive:	$

The undersigned Contractor approves the foregoing release of allowance for completion of each specified item, and as to the extension of time allowed, if any, for completion of the entire work as stated therein, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein ("Work"). Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650, et seq.

This Allowance Expenditure Directive must be signed by an authorized District representative.

It is expressly understood that the authorized allowance expenditure and time, if any, granted herein represent a full accord and satisfaction for any and all time and cost impacts of the items herein, and Contractor waives any and all further compensation or time extension based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, and its subcontractors, both direct and indirect, resulting from additional time required on the project or resulting from delay to the project. Any costs, expenses, damages or time extensions not included are deemed waived.

Signatures:

DISTRICT: LODI UNIFIED SCHOOL DISTRICT Date: _____ By:_____ [Print Name and Title here]	**CONTRACTOR:** _____ Date: _____ By:_____ [Print Name and Title here]
ARCHITECT: _____ Date: _____ By:_____ [Print Name and Title here]	**PROJECT INSPECTOR:** _____ Date: _____ By:_____ [Print Name and Title here]

END OF DOCUMENT

DOCUMENT 00 63 57

PROPOSED CHANGE ORDER FORM

Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240

PCO NO.:

Project: _____
Bid No.: _____
RFI #:_____

Date: _____
DSA File No.: _____
DSA Appl. No.:_____

Contractor hereby submits for District's review and evaluation this Proposed Change Order ("PCO"), submitted in accordance with and subject to the terms of the Contract Documents, including Sections 17.7 and 17.8 of the General Conditions. Any spaces left blank below are deemed no change to cost or time.

Contractor understands and acknowledges that documentation supporting Contractor's PCO must be attached and included for District review and evaluation. Contractor further understands and acknowledges that failure to include documentation sufficient to, in District's discretion, support some or all of the PCO, shall result in a rejected PCO.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add overhead and profit for any and all tiers of Subcontractor**, the total not to exceed ten percent (10%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (f)		
(h)	**Subtotal**		
(i)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (h)		
(j)	**TOTAL**		
(k)	**Time** (zero unless indicated; "TBD" not permitted)	**_____ Calendar Days**	

[REMAINDER OF PAGE LEFT BLANK INTENTIONALLY]

	WORK PERFORMED BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (f)		
(h)	**TOTAL**		
(i)	**Time** (zero unless indicated; "TBD" not permitted)	**_____ Calendar Days**	

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 *et seq*. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

SUBMITTED BY:

Contractor:

_____ _____

[Name] Date

END OF DOCUMENT

DOCUMENT 00 63 63

CHANGE ORDER FORM

Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240

CHANGE ORDER NO.:

CHANGE ORDER

Project: _____
Bid No.: _____

Date: _____
DSA File No.: _____
DSA Appl. No.:_____

The following parties agree to the terms of this Change Order:

Owner: _____
[Name / Address]
_____
_____

Contractor: _____
[Name / Address]
_____
_____

Architect: _____
[Name / Address]
_____
_____

Project Inspector: _____
[Name / Address]
_____
_____

Reference	**Description**	**Cost**	**Days Ext.**
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	

Contract time will be adjusted as follows: Previous Completion Date: [Date] _____[#] Calendar Days Extension (zero unless otherwise indicated) Current Completion Date: [Date]	Original Contract Amount:	$
	Amount of Previously Approved Change Order(s):	$
	Amount of this Change Order:	$
	Contract Amount:	$

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for

completion of the entire work as stated therein, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650, et seq.

This change order is subject to approval by the governing board of this District and must be signed by the District. Until such time as this change order is approved by the District's governing board and executed by a duly authorized District representative, this change order is not effective and not binding.

It is expressly understood that the compensation and time, if any, granted herein represent a full accord and satisfaction for any and all time and cost impacts of the items herein, and Contractor waives any and all further compensation or time extension based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, and its subcontractors, both direct and indirect, resulting from additional time required on the project or resulting from delay to the project. Any costs, expenses, damages or time extensions not included are deemed waived.

Signatures:

District:		Contractor:	
_____	_____	_____	_____
[Name]	Date	[Name]	Date
Architect:		Project Inspector:	
_____	_____	_____	_____
[Name]	Date	[Name]	Date

END OF DOCUMENT

DOCUMENT 00 65 19.26

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

THIS AGREEMENT AND RELEASE OF CLAIMS ("Agreement and Release") IS MADE AND ENTERED INTO THIS _____ DAY OF _____, 20___ by and between the Lodi Unified School District ("District") and _____ _____ ("Contractor"), whose place of business is _____ _____.

RECITALS

WHEREAS, District and Contractor entered into PROJECT/CONTRACT NO.: _____ _____ ("Contract" or "Project") in the County of San Joaquin, California; and

WHEREAS, the Work under the Contract was completed on _____, and a Notice of Completion was recorded with the County Recorder on _____.

NOW, THEREFORE, it is mutually agreed between District and Contractor as follows:

AGREEMENT AND RELEASE

1. Contractor will only be assessed liquidated damages as detailed below:

   Original Contract Sum $_____

   Modified Contract Sum $_____

   Payment to Date $_____

   Liquidated Damages $_____

   Payment Due Contractor $_____

2. Subject to the provisions hereof, District shall forthwith pay to Contractor the undisputed sum of _____ Dollars ($_____) under the Contract, less any amounts represented by any notice to withhold funds on file with District as of the date of such payment.

3. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against District arising from the performance of work under the Contract, except for the claims described in Paragraph 5 and continuing obligations described in Paragraph 6. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against District and all of its respective agents, employees, trustees, inspectors, assignees, consultants and transferees, except for any Disputed Claim that may be set forth in Paragraph 6 and the continuing obligations described in Paragraph 8 hereof.

4. The following claims are disputed (hereinafter, the "Disputed Claims") and are specifically excluded from the operation of this Agreement and Release:

Claim No.	Description of Claim	Amount of Claim	Date Claim Submitted
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____

[If further space is required, attach additional sheets showing the required information.]

5. Consistent with California Public Contract Code section 7100, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 1 hereof, Contractor hereby releases and forever discharges District, all its agents, employees, inspectors, assignees, and transferees from any and all liability, claims, demands, actions, or causes of action of whatever kind or nature arising out of or in any way concerned with the Work under the Contract.

6. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, including without limitation the duty to defend, indemnify and hold harmless the District, shall remain in full force and effect as specified in the Contract Documents.

7. Contractor hereby waives the provisions of California Civil Code section 1542 which provides as follows:

> A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE AND THAT, IF KNOWN BY HIM OR HER, WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY.

8. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable. If any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal, or other law, ruling, or regulations, then such provision, or part thereof, shall remain in force and effect to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.

9. All rights of District shall survive completion of the Work or termination of Contract, and execution of this Release.

* * * CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING * * *

LODI UNIFIED SCHOOL DISTRICT

Signature: _____

Print Name: _____

Title: _____

CONTRACTOR: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 65 36

GUARANTEE FORM

_____ ("Contractor") hereby agrees that the _____ _____ ("Work" of Contractor) which Contractor has installed for the Lodi Unified School District ("District") for the following project:

PROJECT:_____

("Project" or "Contract") has been performed in accordance with the requirements of the Contract Documents and that the Work as installed will fulfill the requirements of the Contract Documents.

The undersigned agrees to repair or replace any or all of such Work that may prove to be defective in workmanship or material together with any other adjacent Work that may be displaced in connection with such replacement within a period of Two[A1] years from the date of completion as defined in Public Contract Code section 7107, subdivision (c), ordinary wear and tear and unusual abuse or neglect excepted. The date of completion is _____, 20___.

In the event of the undersigned's failure to comply with the above-mentioned conditions within a reasonable period of time, as determined by the District, but not later than seven (7) days after being notified in writing by the District, the undersigned authorizes the District to proceed to have said defects repaired and made good at the expense of the undersigned. The undersigned shall pay the costs and charges therefor upon demand.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

Representatives to be contacted for service subject to terms of Contract:

Name: _____

Address: _____

Phone No.: _____

Email: _____

END OF DOCUMENT

DOCUMENT 00 72 13

TABLE OF CONTENTS

Page

1. CONTRACT TERMS AND DEFINITIONS 1

1.1 Definitions 1

1.2 Laws Concerning the Contract 6

1.3 No Oral Agreements 6

1.4 No Assignment 6

1.5 Notice and Service Thereof 7

1.6 No Waiver 7

1.7 Substitutions for Specified Items 7

1.8 Materials and Work 7

2. [RESERVED] 9

3. ARCHITECT 9

4. CONSTRUCTION MANAGER 10

5. INSPECTOR, INSPECTIONS, AND TESTS 10

5.1 Project Inspector 10

5.2 Tests and Inspections 11

5.3 Costs for After Hours and/or Off Site Inspections 11

6. CONTRACTOR 11

6.1 Status of Contractor 12

6.2 Project Inspection Card(s) 12

6.3 Contractor's Supervision 12

6.4 Duty to Provide Fit Workers 13

6.5 Field Office 13

6.6 Purchase of Materials and Equipment 13

6.7 Documents on Work 13
6.8 Preservation of Records 14
6.9 Integration of Work 15
6.10 Notifications 15
6.11 Obtaining of Permits, Licenses and Registrations 16
6.12 Royalties and Patents 16
6.13 Work to Comply With Applicable Laws and Regulations 16
6.14 Safety/Protection of Persons and Property 17
6.15 Working Evenings and Weekends 20
6.16 Cleaning Up 20
7. SUBCONTRACTORS 21
8. OTHER CONTRACTS/CONTRACTORS 22
9. DRAWINGS AND SPECIFICATIONS 23
10. CONTRACTOR'S SUBMITTALS AND SCHEDULES 24
10.1 Schedule of Work, Schedule of Submittals, and Schedule of Values 24
10.2 Monthly Progress Schedule(s) 27
10.3 Material Safety Data Sheets (MSDS) 27
11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS 28
11.1 Site Investigation 28
11.2 Soils Investigation Report 28
11.3 Access to Work 28
11.4 Layout and Field Engineering 28
11.5 Utilities 29
11.6 Sanitary Facilities 29
11.7 Surveys 29
11.8 Regional Notification Center 29
11.9 Existing Utility Lines 29

11.10 Notification 30
11.11 Hazardous Materials 30
11.12 No Signs 30
12. TRENCHES 31
12.1 Trenches Greater Than Five Feet 31
12.2 Excavation Safety 31
12.3 No Tort Liability of District 31
12.4 No Excavation without Permits 31
12.5 Discovery of Hazardous Waste and/or Unusual Conditions 31
13. INSURANCE AND BONDS 32
13.1 Insurance 32
13.2 Contract Security - Bonds 36
14. WARRANTY/GUARANTEE/INDEMNITY 36
14.1 Warranty/Guarantee 36
14.2 Indemnity and Defense 37
15. TIME 39
15.1 Notice to Proceed 39
15.2 Computation of Time / Adverse Weather 39
15.3 Hours of Work 40
15.4 Progress and Completion 41
15.5 Schedule 41
15.6 Expeditious Completion 41
16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES 41
16.1 Liquidated Damages 41
16.2 Excusable Delay 41
16.3 No Additional Compensation for Delays Within Contractor's Control 42
16.4 Float or Slack in the Schedule 43

17. CHANGES IN THE WORK 43
17.1 No Changes Without Authorization 43
17.2 Architect Authority 44
17.3 Change Orders 44
17.4 Construction Change Directives 44
17.5 Force Account Directives 44
17.6 Price Request 45
17.7 Proposed Change Order 46
17.8 Format for Proposed Change Order 48
17.9 Change Order Certification 50
17.10 Determination of Change Order Cost 50
17.11 Deductive Change Orders 50
17.12 Addition or Deletion of Alternate Bid Item(s) 51
17.13 Discounts, Rebates, and Refunds 51
17.14 Accounting Records 51
17.15 Notice Required 51
17.16 Applicability to Subcontractors 52
17.17 Alteration to Change Order Language 52
17.18 Failure of Contractor to Execute Change Order 52
18. REQUEST FOR INFORMATION 52
19. PAYMENTS 52
19.1 Contract Price 52
19.2 Applications for Progress Payments 52
19.3 Progress Payments 55
19.4 Decisions to Withhold Payment 57
19.5 Subcontractor Payments 59
20. COMPLETION OF THE WORK 60

20.1 Completion 60
20.2 Close-Out/Certification Procedures 60
20.3 Final Inspection 61
20.4 Costs of Multiple Inspections 62
20.5 Partial Occupancy or Use Prior to Completion 62
21. FINAL PAYMENT AND RETENTION 63
21.1 Final Payment 63
21.2 Prerequisites for Final Payment 63
21.3 Retention 64
21.4 Substitution of Securities 64
22. UNCOVERING OF WORK 64
23. NONCONFORMING WORK AND CORRECTION OF WORK 65
23.1 Nonconforming Work 65
23.2 Correction of Work 65
23.3 District's Right to Perform Work 65
24. TERMINATION AND SUSPENSION 66
24.1 District's Right to Terminate Contractor for Cause 66
24.2 Termination of Contractor for Convenience 69
24.3 Suspension of Work 70
25. CLAIMS PROCESS 70
25.1 Performance during Claim Process 70
25.2 Definition of Claim 70
25.3 Claims Presentation 71
25.4 Claim Resolution pursuant to Public Contract Code section 9204 72
25.5 Subcontractor Pass-Through Claims 73
25.6 Government Code Claim Act Claim 74

25.7 Claim Resolution pursuant to Public Contract Code section 20104 et seq. 74
25.8 Claim Resolution Non-Applicability 76
25.9 Attorney's Fees 76
26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS 76
26.1 Labor Compliance and Enforcement 76
26.2 Wage Rates, Travel, and Subsistence 76
26.3 Hours of Work 77
26.4 Payroll Records 78
26.5 [RESERVED] 79
26.6 Apprentices 79
26.7 Non-Discrimination 80
26.8 Labor First Aid 81
27. [RESERVED] 81
28. MISCELLANEOUS 81
28.1 Assignment of Antitrust Actions 81
28.2 Excise Taxes 82
28.3 Taxes 82
28.4 Shipments 82
28.5 Compliance with Government Reporting Requirements 82

DOCUMENT 00 72 13

GENERAL CONDITIONS

1. CONTRACT TERMS AND DEFINITIONS

1.1 Definitions

Wherever used in the Contract Documents, the following terms shall have the meanings indicated, which shall be applicable to both the singular and plural thereof:

1.1.1 Adverse Weather: Shall be only weather that satisfies all of the following conditions: (1) unusually severe precipitation, sleet, snow, hail, or extreme temperature conditions in excess of the norm for the location and time of year it occurred based on the closest weather station data averaged over the past five years, (2) that is unanticipated and would cause unsafe work conditions and/or is unsuitable for scheduled work that should not be performed during inclement weather (i.e., exterior finishes), and (3) at the Project.

1.1.2 Allowance Expenditure Directive: Written authorization for expenditure of allowance, if any.

1.1.3 Approval, Approved, and/or Accepted: Written authorization, unless stated otherwise.

1.1.4 Architect (or "Design Professional in General Responsible Charge"): The individual, partnership, corporation, joint venture, or any combination thereof, named as Architect, who will have the rights and authority assigned to the Architect in the Contract Documents. The term Architect means the Design Professional in General Responsible Charge as defined in DSA PR 13-02 on this Project or the Architect's authorized representative.

1.1.5 As-Builts: Reproducible blue line prints of drawings to be prepared on a monthly basis pursuant to the Contract Documents, that reflect changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed since the preceding monthly submittal. See **Record Drawings**.

1.1.6 Bidder: A contractor who intends to provide a proposal to the District to perform the Work of this Contract.

1.1.7 Change Order: A written order to the Contractor authorizing an addition to, deletion from, or revision in the Work, and/or authorizing an adjustment in the Contract Price or Contract Time.

1.1.8 Claim: A Dispute that remains unresolved at the conclusion of the all the applicable Dispute Resolution requirements provided herein.

1.1.9 Construction Change Directive: A written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work.

1.1.10 Construction Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Construction Manager is used on the Project that is the subject of this Contract, then all references to Construction Manager herein shall be read to refer to District.

1.1.11 Construction Schedule: The progress schedule of construction of the Project as provided by Contractor and approved by District.

1.1.12 Contract, Contract Documents: The Contract consists exclusively of the documents evidencing the agreement of the District and Contractor, identified as the Contract Documents. The Contract Documents consist of the following documents:

1.1.12.1 Notice to Bidders
1.1.12.2 Instructions to Bidders
1.1.12.3 Bid Form and Proposal
1.1.12.4 Bid Bond
1.1.12.5 Designated Subcontractors List
1.1.12.6 Site Visit Certification (if a site visit was required)
1.1.12.7 Non-Collusion Declaration
1.1.12.8 Notice of Award
1.1.12.9 Notice to Proceed
1.1.12.10 Agreement
1.1.12.11 Escrow of Bid Documentation
1.1.12.12 Escrow Agreement for Security Deposits in Lieu of Retention (if applicable)
1.1.12.13 Performance Bond
1.1.12.14 Payment Bond (Contractor's Labor & Material Bond)
1.1.12.15 General Conditions
1.1.12.16 Special Conditions (if applicable)
1.1.12.17 Project Labor Agreement (if applicable)
1.1.12.18 Hazardous Materials Procedures and Requirements
1.1.12.19 Workers' Compensation Certification
1.1.12.20 Prevailing Wage Certification
1.1.12.21 Disabled Veteran Business Enterprise Participation Certification (if applicable)
1.1.12.22 Drug-Free Workplace Certification (if applicable)
1.1.12.23 Tobacco-Free Environment Certification
1.1.12.24 Hazardous Materials Certification (if applicable)
1.1.12.25 Lead-Based Materials Certification (if applicable)
1.1.12.26 Imported Materials Certification (if applicable)
1.1.12.27 Criminal Background Investigation/Fingerprinting Certification
1.1.12.28 Buy American Certification (if applicable)
1.1.12.29 Roofing Project Certification (if applicable)
1.1.12.30 Registered Subcontractors List
1.1.12.31 Iran Contracting Act Certification (if applicable)
1.1.12.32 Post Bid Interview
1.1.12.33 All Plans, Technical Specifications, and Drawings
1.1.12.34 Any and all addenda to any of the above documents
1.1.12.35 Any and all change orders or written modifications to the above documents if approved in writing by the District

1.1.13 Contract Price: The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.1.14 Contract Time: The time period stated in the Agreement for the completion of the Work.

1.1.15 Contractor: The person or persons identified in the Agreement as contracting to perform the Work to be done under this Contract, or the legal representative of such a person or persons.

1.1.16 Daily Job Report(s): Daily Project reports prepared by the Contractor's employee(s) who are present on Site, which shall include the information required herein.

1.1.17 Day(s): Unless otherwise designated, day(s) means calendar day(s).

1.1.18 Department of Industrial Relations (or "DIR"): is responsible, among other things, for labor compliance monitoring and enforcement of California prevailing wage laws and regulations for public works contracts.

1.1.19 Design Professional in General Responsible Charge: See definition of **Architect** above.

1.1.20 Dispute: A separate demand by Contractor for a time extension, or payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to; or an amount of payment disputed by the District.

1.1.21 District: The public agency or the school district for which the Work is performed. The governing board of the District or its designees will act for the District in all matters pertaining to the Contract. The District may, at any time,

1.1.21.1 Direct the Contractor to communicate with or provide notice to the Construction Manager or the Architect on matters for which the Contract Documents indicate the Contractor will communicate with or provide notice to the District; and/or

1.1.21.2 Direct the Construction Manager or the Architect to communicate with or direct the Contractor on matters for which the Contract Documents indicate the District will communicate with or direct the Contractor.

1.1.22 Drawings (or "Plans"): The graphic and pictorial portions of the Contract Documents showing the design, location, scope and dimensions of the work, generally including plans, elevations, sections, details, schedules, sequence of operation, and diagrams.

1.1.23 DSA: Division of the State Architect.

1.1.24 Force Account Directive: A process that may be used when the District and the Contractor cannot agree on a price for a specific portion of work or before the Contractor prepares a price for a specific portion of work and whereby the Contractor performs the work as indicated herein on a time and materials basis.

1.1.25 Job Cost Reports: Any and all reports or records detailing the costs associated with work performed on or related to the Project that Contractor shall maintain for the Project. Specifically, Job Cost Reports shall contain, but are not limited by or to, the following information: a description of the work performed or to be performed on the Project; quantity, if applicable, of work performed (hours, square feet, cubic yards, pounds, etc.) for the Project; Project budget; costs for the Project to date; estimated costs to complete the Project; and expected costs at completion. The Job Cost Reports shall also reflect all Contract cost codes, change orders, elements of non-conforming work, back charges, and additional services.

1.1.26 Labor Commissioner's Office (or "Labor Commissioner", also known as the Division of Labor Standards Enforcement ("DLSE")): Division of the DIR responsible for adjudicating wage claims, investigating discrimination and public works complaints, and enforcing Labor Code statutes and Industrial Welfare Commission orders.

1.1.27 Municipal Separate Storm Sewer System (or "MS4"): A system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

1.1.28 Plans: See **Drawings**.

1.1.29 Premises: The real property owned by the District on which the Site is located.

1.1.30 Product(s): New material, machinery, components, equipment, fixtures and systems forming the Work, including existing materials or components required and approved by the District for reuse.

1.1.31 Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.

1.1.32 Program Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Program Manager is designated for Project that is the subject of this Contract, then all references to Project Manager herein shall be read to refer to District.

1.1.33 Project: The planned undertaking as provided for in the Contract Documents.

1.1.34 Project Inspector (or "Inspector"): The individual(s) retained by the District in accordance with title 24 of the California Code of Regulations to monitor and inspect the Project.

1.1.35 Project Labor Agreement (or "PLA"): a prehire collective bargaining agreement in accordance with Public Contract Code section 2500 et seq. that establishes terms and conditions of employment for a specific construction project or projects and/or is an agreement described in Section 158(f) of Title 29 of the United States Code.

1.1.36 Proposed Change Order (or "PCO"): a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

1.1.37 Provide: Shall include "provide complete in place," that is, "furnish and install," and "provide complete and functioning as intended in place" unless specifically stated otherwise.

1.1.38 Qualified SWPPP Practitioners (or "QSP"): certified personnel that attended a State Water Resources Control Board sponsored or approved training class and passed the qualifying exam.

1.1.39 Record Drawings: Reproducible drawings (or Plans) prepared pursuant to the requirements of the Contract Documents that reflect all changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed upon completion of the Project. See also **As-Builts**.

1.1.40 Request for Information (or "RFI"): A written request prepared by the Contractor requesting that the Architect provide additional information necessary to clarify or amplify an item in the Contract Documents that the Contractor believes is not clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems that have arisen under field conditions.

1.1.41 Request for Substitution for Specified Item: A request by Contractor to substitute an equal or superior material, product, thing, or service for a specific material, product, thing, or service that has been designated in the Contract Documents by a specific brand or trade name.

1.1.42 Safety Orders: Written and/or verbal orders for construction issued by the California Division of Occupational Safety and Health ("CalOSHA") or by the United States Occupational Safety and Health Administration ("OSHA").

1.1.43 Safety Plan: Contractor's safety plan specifically adapted for the Project. Contractor's Safety Plan shall comply with all provisions regarding Project safety, including all applicable provisions in these General Conditions.

1.1.44 Samples: Physical examples that illustrate materials, products, equipment, finishes, colors, or workmanship and that, when approved in accordance with the Contract Documents, establish standards by which portions of the Work will be judged.

1.1.45 Shop Drawings: All drawings, prints, diagrams, illustrations, brochures, schedules, and other data that are prepared by the Contractor, a subcontractor, manufacturer, supplier, or distributor, that illustrate how specific portions of the Work shall be fabricated or installed.

1.1.46 Site: The Project site as shown on the Drawings.

1.1.47 Specifications: That portion of the Contract Documents, Division 1 through Division 49, and all technical sections, and addenda to all of these, if any,

consisting of written descriptions and requirements of a technical nature of materials, equipment, construction methods and systems, standards, and workmanship.

1.1.48 State: The State of California.

1.1.49 Storm Water Pollution Prevention Plan (or "SWPPP"): A document which identifies sources and activities at a particular facility that may contribute pollutants to storm water and contains specific control measures and time frames to prevent or treat such pollutants.

1.1.50 Subcontractor: A contractor and/or supplier who is under contract with the Contractor or with any other subcontractor, regardless of tier, to perform a portion of the Work of the Project.

1.1.51 Submittal Schedule: The schedule of submittals as provided by Contractor and approved by District.

1.1.52 Surety: The person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond, and must be a California admitted surety insurer as defined in the Code of Civil Procedure section 995.120.

1.1.53 Work: All labor, materials, equipment, components, appliances, supervision, coordination, and services required by, or reasonably inferred from, the Contract Documents, that are necessary for the construction and completion of the Project.

1.2 Laws Concerning the Contract

Contract is subject to all provisions of the Constitution and laws of California and the United States governing, controlling, or affecting District, or the property, funds, operations, or powers of District, and such provisions are by this reference made a part hereof. Any provision required by law to be included in this Contract shall be deemed to be inserted.

1.3 No Oral Agreements

No oral agreement or conversation with any officer, agent, or employee of District, either before or after execution of Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract.

1.4 No Assignment

Contractor shall not assign this Contract or any part thereof including, without limitation, any services or money to become due hereunder without the prior written consent of the District. Assignment without District's prior written consent shall be null and void. Any assignment of money due or to become due under this Contract shall be subject to a prior lien for services rendered or material supplied for performance of work called for under this Contract in favor of all persons, firms, or corporations rendering services or supplying material to the extent that claims are filed pursuant to the Civil Code, Code of Civil Procedure, Government Code, Labor Code, and/or Public Contract Code, and shall also be subject to deductions for liquidated damages or withholding of payments as determined by District in accordance with this Contract. Contractor shall not assign or

transfer in any manner to a Subcontractor or supplier the right to prosecute or maintain an action against the District.

1.5 Notice and Service Thereof

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

1.5.1.1 If notice is given by personal delivery thereof, it shall be considered delivered on the day of delivery.

1.5.1.2 If notice is given by overnight delivery service, it shall be considered delivered one (1) day after date deposited, as indicated by the delivery service.

1.5.1.3 If notice is given by depositing same in United States mail, enclosed in a sealed envelope, it shall be considered delivered three (3) days after date deposited, as indicated by the postmarked date.

1.5.1.4 If notice is given by registered or certified mail with postage prepaid, return receipt requested, it shall be considered delivered on the day the notice is signed for.

1.5.1.5 Electronic mail may be used for convenience but is not a substitute for the notice and service requirements herein.

1.6 No Waiver

The failure of District in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion. No action or failure to act by the District, Architect, or Construction Manager shall constitute a waiver of any right or duty afforded the District under the Contract, nor shall any action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

1.7 Substitutions for Specified Items

Unless the Special Conditions contain different provisions, Contractor shall not substitute different items for any items identified in the Contract Documents without prior written approval of the District.

1.8 Materials and Work

1.8.1 Except as otherwise specifically stated in this Contract, Contractor shall provide and pay for all materials, labor, tools, equipment, transportation, supervision, temporary constructions of every nature, and all other services, management, and facilities of every nature whatsoever necessary to execute and complete this Contract, in a good and workmanlike manner, within the Contract Time.

1.8.2 Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and grades as noted or specified, workmanship shall be of good quality, and Contractor shall use all diligence to inform itself fully as to the required manufacturer's instructions and to comply therewith.

1.8.3 Materials shall be furnished in ample quantities and at such times as to insure uninterrupted progress of Work and shall be stored properly and protected from the elements, theft, vandalism, or other loss or damage as required.

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

1.8.5 Contractor shall, after award of Contract by District and after relevant submittals have been approved, place orders for materials and/or equipment as specified so that delivery of same may be made without delays to the Work. Contractor shall, upon demand from District, present documentary evidence showing that orders have been placed.

1.8.6 District reserves the right but has no obligation, in response to Contractor's neglect or failure in complying with the above instructions, to place orders for such materials and/or equipment as the District may deem advisable in order that the Work may be completed at the date specified in the Agreement, and all expenses incidental to the procuring of said materials and/or equipment shall be paid for by Contractor or deducted from payment(s) to Contractor.

1.8.7 Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver the Site to District, together with all improvements and appurtenances constructed or placed thereon by it, and free from any claims, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract shall have any right to lien any portion of the Premises or any improvement or appurtenance thereon, except that Contractor may install metering devices or other equipment of utility companies or of political subdivision, title to which is commonly retained by utility company or political subdivision. In the event of installation of any such metering device or equipment, Contractor shall advise District as to owner thereof.

1.8.7.1 If a lien or a claim based on a stop payment notice of any nature should at any time be filed against the Work or any District property, by any entity that has supplied material or services at the request of the Contractor, Contractor and Contractor's Surety shall promptly, on demand by District and at Contractor's and Surety's own expense, take any and all action necessary to cause any such lien or a claim based on a stop payment notice to be released or discharged immediately therefrom.

1.8.7.2 If the Contractor fails to furnish to the District within ten (10) calendar days after demand by the District, satisfactory evidence that a lien or a claim based on a stop payment notice has been so released, discharged, or secured, the District may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney's fees and expense incurred or suffered by District from any sum payable to Contractor under the Contract.

1.8.8 Nothing contained in this Article, however, shall defeat or impair the rights of persons furnishing materials or labor under any bond given by Contractor for their protection or any rights under any law permitting such protection or any rights under any law permitting such persons to look to funds due Contractor in hands of District (e.g., stop payment notices), and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

1.8.9 Title to new materials and/or equipment for the Work of this Contract and attendant liability for its protection and safety shall remain with Contractor until incorporated in the Work of this Contract and accepted by District. No part of any materials and/or equipment shall be removed from its place of storage except for immediate installation in the Work of this Contract. Should the District, in its discretion, allow the Contractor to store materials and/or equipment for the Work off-site, Contractor will store said materials and/or equipment at a bonded warehouse and with appropriate insurance coverage at no cost to District. Contractor shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to District or its authorized representative and shall, at the District's request, forward it to the District.

2. [RESERVED]

3. ARCHITECT

3.1 The Architect shall represent the District during the Project and will observe the progress and quality of the Work on behalf of the District. Architect shall have the authority to act on behalf of District to the extent expressly provided in the Contract Documents and to the extent determined by District. Architect shall have authority to reject materials, workmanship, and/or the Work whenever rejection may be necessary, in Architect's reasonable opinion, to insure the proper execution of the Contract.

3.2 Architect shall, with the District and on behalf of the District, determine the amount, quality, acceptability, and fitness of all parts of the Work, and interpret the Specifications, Drawings, and shall, with the District, interpret all other Contract Documents.

3.3 Architect shall have all authority and responsibility established by law, including title 24 of the California Code of Regulations.

3.4 Contractor shall provide District and the Construction Manager with a copy of all written communication between Contractor and Architect at the same time as that communication is made to Architect, including, without limitation, all RFIs, correspondence, submittals, claims, and proposed change orders.

4. CONSTRUCTION MANAGER

4.1 If a Construction Manager is used on this Project ("Construction Manager" or "CM"), the Construction Manager will provide administration of the Contract on the District's behalf. After execution of the Contract and Notice to Proceed, all correspondence and/or instructions from Contractor and/or District shall be forwarded through the Construction Manager. The Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences, or procedures or for safety precautions in connection with the Work, which shall all remain the Contractor's responsibility.

4.2 The Construction Manager, however, will have authority to reject materials and/or workmanship not conforming to the Contract Documents, as determined by the District, the Architect, and/or the Project Inspector. The Construction Manager shall also have the authority to require special inspection or testing of any portion of the Work, whether it has been fabricated, installed, or fully completed. Any decision made by the Construction Manager, in good faith, shall not give rise to any duty or responsibility of the Construction Manager to: the Contractor; any Subcontractor; the Contractor or Subcontractor's respective agents, employees; or other persons performing any of the Work. The Construction Manager shall have free access to any or all parts of Work at any time.

4.3 If the District does not use a Construction Manager on this Project, all references to Construction Manager or CM shall be read as District.

5. INSPECTOR, INSPECTIONS, AND TESTS

5.1 Project Inspector

5.1.1 One or more Project Inspector(s), including special Project Inspector(s), as required, will be assigned to the Work by District, in accordance with requirements of title 24, part 1, of the California Code of Regulations, to enforce the building code and monitor compliance with Plans and Specifications for the Project previously approved by the DSA. Duties of Project Inspector(s) are specifically defined in section 4-342 of said part 1 of title 24.

5.1.2 No Work shall be carried on except with the knowledge and under the inspection of the Project Inspector(s). The Project Inspector(s) shall have free access to any or all parts of Work at any time. Contractor shall furnish Project Inspector(s) reasonable opportunities for obtaining such information as may be necessary to keep Project Inspector(s) fully informed respecting progress and manner of work and character of materials, including, but not limited to, submission of form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector at least 48 hours in advance of the commencement and completion of construction of each and every aspect of the Work. Forms are available on the DSA's website at: http://www.dgs.ca.gov/dsa/Forms.aspx. Inspection of Work shall not relieve Contractor from an obligation to fulfill this Contract. Project Inspector(s) and the DSA are authorized to suspend work whenever the Contractor and/or its Subcontractor(s) are not complying with the Contract Documents. Any work stoppage by the Project Inspector(s) and/or DSA shall be without liability to the District. Contractor shall instruct its Subcontractors and employees accordingly.

5.1.3 If Contractor and/or any Subcontractor requests that the Project Inspector(s) perform any inspection off-site, this shall only be done if it is allowable pursuant to applicable regulations and DSA approval, if the Project Inspector(s) agree to do so, and at the expense of the Contractor.

5.2 Tests and Inspections

5.2.1 Tests and Inspections shall comply with title 24, part 1, California Code of Regulations, group 1, article 5, section 4-335, and with the provisions of the Specifications.

5.2.2 The District will select an independent testing laboratory to conduct the tests. Selection of the materials required to be tested shall be by the laboratory or the District's representative and not by the Contractor. The Contractor shall notify the District's representative a sufficient time in advance of its readiness for required observation or inspection.

5.2.3 The Contractor shall notify the District's representative a sufficient time in advance of the manufacture of material to be supplied under the Contract Documents, which must by terms of the Contract Documents be tested, in order that the District may arrange for the testing of same at the source of supply. This notice shall be provided, at a minimum, seventy-two (72) hours prior to the manufacture of the material that needs to be tested.

5.2.4 Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated into and/or onto the Project.

5.2.5 The District will select the testing laboratory and pay for the cost of all tests and inspections. Contractor shall reimburse the District for any and all laboratory costs or other testing costs for any materials found to be not in compliance with the Contract Documents. At the District's discretion, District may elect to deduct laboratory or other testing costs for noncompliant materials from the Contract Price, and such deduction shall not constitute a withholding.

5.3 Costs for After Hours and/or Off Site Inspections

If the Contractor performs Work outside the Inspector's regular working hours or requests the Inspector to perform inspections off Site, costs of any inspections required outside regular working hours or off Site shall be borne by the Contractor and may be invoiced to the Contractor by the District or the District may deduct those expenses from the next Progress Payment.

6. CONTRACTOR

Contractor shall construct and complete, in a good and workmanlike manner, the Work for the Contract Price including any adjustment(s) to the Contract Price pursuant to provisions herein regarding changes to the Contract Price. Except as otherwise noted, Contractor shall provide and pay for all labor, materials, equipment, permits (excluding DSA), fees, licenses, facilities, transportation, taxes, bonds and insurance, and services necessary for the proper execution and completion of the Work, except as indicated herein.

6.1 Status of Contractor

6.1.1 Contractor is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it and its Subcontractors perform the services required of it by the Contract Documents. Nothing herein contained shall be construed as creating the relationship of employer and employee, or principal and agent, between the District, or any of the District's employees or agents, and Contractor or any of Contractor's Subcontractors, agents or employees. Contractor assumes exclusively the responsibility for the acts of its agents, and employees as they relate to the services to be provided during the course and scope of their employment. Contractor, its Subcontractors, agents, and its employees shall not be entitled to any rights or privileges of District employees. District shall be permitted to monitor the Contractor's activities to determine compliance with the terms of this Contract.

6.1.2 As required by law, Contractor and all Subcontractors shall be properly licensed and regulated by the Contractors State License Board, 9821 Business Park Drive, Sacramento, California 95827, http://www.cslb.ca.gov.

6.1.3 As required by law, Contractor and all Subcontractors shall be properly registered as public works contractors by the Department of Industrial Relations at: https://efiling.dir.ca.gov/PWCR/ActionServlet?action=displayPWCRegistrationForm or current URL.

6.1.4 Contractor represents that it has no existing interest and will not acquire any interest, direct or indirect, which could conflict in any manner or degree with the performance of Work required under this Contract and that no person having any such interest shall be employed by Contractor.

6.2 Project Inspection Card(s)

Contractor shall verify that forms DSA 152 (or the current version applicable at the time the Work is performed) are issued for the Project prior to the commencement of construction.

6.3 Contractor's Supervision

6.3.1 During progress of the Work, Contractor shall keep on the Premises, and at all other locations where any Work related to the Contract is being performed, an experienced and competent project manager and construction superintendent who are employees of the Contractor, to whom the District does not object and at least one of whom shall be fluent in English, written and verbal.

6.3.2 The project manager and construction superintendent shall both speak fluently the predominant language of the Contractor's employees.

6.3.3 Before commencing the Work herein, Contractor shall give written notice to District of the name of its project manager and construction superintendent. Neither the Contractor's project manager nor construction superintendent shall be changed except with prior written notice to District. If the Contractor's project manager and/or construction superintendent proves to be unsatisfactory to Contractor, or to District, any of the District's employees, agents, the Construction Manager, or the Architect, Contractor shall notify District in writing before any

change occurs, but no less than two (2) business days prior. Any replacement of the project manager and/or construction superintendent shall be made promptly and must be satisfactory to the District. The Contractor's project manager and construction superintendent shall each represent Contractor, and all directions given to Contractor's project manager and/or construction superintendent shall be as binding as if given to Contractor.

6.3.4 Contractor shall give efficient supervision to Work, using its best skill and attention. Contractor shall carefully study and compare all Contract Documents, Drawings, Specifications, and other instructions and shall at once report to District, Construction Manager, and Architect any error, inconsistency, or omission that Contractor or its employees and Subcontractors may discover, in writing, with a copy to District's Project Inspector(s). The Contractor shall have responsibility for discovery of errors, inconsistencies, or omissions.

6.4 Duty to Provide Fit Workers

6.4.1 Contractor and Subcontractor(s) shall at all times enforce strict discipline and good order among their employees and shall not employ or work any unfit person or anyone not skilled in work assigned to that person. It shall be the responsibility of Contractor to ensure compliance with this requirement. District may require Contractor to permanently remove unfit persons from Project Site.

6.4.2 Any person in the employ of Contractor or Subcontractor(s) whom District may deem incompetent or unfit shall be excluded from working on the Project and shall not again be employed on the Project except with the prior written consent of District.

6.4.3 The Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.

6.4.4 If Contractor intends to make any change in the name or legal nature of the Contractor's entity, Contractor must first notify the District in writing prior to making any contemplated change. The District shall determine in writing if Contractor's intended change is permissible while performing this Contract.

6.5 Field Office

6.5.1 Contractor shall provide a temporary office on the Work Site for the District's use exclusively, during the term of the Contract.

6.6 Purchase of Materials and Equipment

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from District to assure that there will be no delays.

6.7 Documents on Work

6.7.1 Contractor shall at all times keep on the Work Site, or at another location as the District may authorize in writing, one legible copy of all Contract Documents, including Addenda and Change Orders, and Titles 19 and 24 of the California Code of Regulations, the specified edition(s) of the Uniform Building Code, all approved

Drawings, Plans, Schedules, and Specifications, and all codes and documents referred to in the Specifications, and made part thereof. These documents shall be kept in good order and available to District, Construction Manager, Architect, Architect's representatives, the Project Inspector(s), and all authorities having jurisdiction. Contractor shall be acquainted with and comply with the provisions of these titles as they relate to this Project. (See particularly the duties of Contractor, Title 24, Part 1, California Code of Regulations, section 4-343.) Contractor shall also be acquainted with and comply with all California Code of Regulations provisions relating to conditions on this Project, particularly Titles 8 and 17. Contractor shall coordinate with Architect and Construction Manager and shall submit its verified report(s) according to the requirements of Title 24.

6.7.2 Daily Job Reports.

6.7.2.1 Contractor shall maintain, at a minimum, at least one (1) set of Daily Job Reports on the Project. These must be prepared by the Contractor's employee(s) who are present on Site, and must include, at a minimum, the following information:

6.7.2.1.1 A brief description of all Work performed on that day.
6.7.2.1.2 A summary of all other pertinent events and/or occurrences on that day.
6.7.2.1.3 The weather conditions on that day.
6.7.2.1.4 A list of all Subcontractor(s) working on that day, including DIR registration numbers.
6.7.2.1.5 A list of each Contractor employee working on that day and the total hours worked for each employee.
6.7.2.1.6 A complete list of all equipment on Site that day, whether in use or not.
6.7.2.1.7 A complete list of all materials, supplies, and equipment delivered on that day.
6.7.2.1.8 A complete list of all inspections and tests performed on that day.

6.7.2.2 Each day Contractor shall provide a copy of the previous day's Daily Job Report to the District or the Construction Manager.

6.8 Preservation of Records

Contractor shall maintain, and District shall have the right to inspect, Contractor's financial records for the Project, including, without limitation, Job Cost Reports for the Project in compliance with the criteria set forth herein. The District shall have the right to examine and audit all Daily Job Reports or other Project records of Contractor's project manager(s), project superintendent(s), and/or project foreperson(s), all certified payroll records and/or related documents including, without limitation, Job Cost Reports, payroll, payment, timekeeping and tracking documents; all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports, and other data of the Contractor, any Subcontractor, and/or supplier, including computations and projections related to bidding, negotiating, pricing, or performing the Work or Contract modification, in order to evaluate the accuracy, completeness, and currency of the cost, manpower, coordination, supervision, or pricing data at no additional cost to the District. These documents may be duplicative and/or be in addition to any Bid Documents held in escrow by the District. The Contractor shall make available at its

office at all reasonable times the materials described in this paragraph for the examination, audit, or reproduction until three (3) years after final payment under this Contract. Notwithstanding the provisions above, Contractor shall provide any records requested by any governmental agency, if available, after the time set forth above.

6.9 Integration of Work

6.9.1 Contractor shall do all cutting, fitting, patching, and preparation of Work as required to make its several parts come together properly, to fit it to receive or be received by work of other contractors, and to coordinate tolerances to various pieces of work, showing upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and shall conform them as District and/or Architect may direct.

6.9.2 Contractor shall make its own layout of lines and elevations and shall be responsible for the accuracy of both Contractor's and Subcontractors' work resulting therefrom.

6.9.3 Contractor and all Subcontractors shall take all field dimensions required in performance of the Work, and shall verify all dimensions and conditions on the Site. All dimensions affecting proper fabrication and installation of all Work must be verified prior to fabrication by taking field measurements of the true conditions. If there are any discrepancies between dimensions in drawings and existing conditions which will affect the Work, Contractor shall bring such discrepancies to the attention of the District and Architect for adjustment before proceeding with the Work. In doing so, it is recognized that Contractor is not acting in the capacity of a licensed design professional, and that Contractor's examination is made in good faith to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from Contractor, the District and/or Architect shall inform Contractor what action, if any, Contractor shall take with regard to such discrepancies.

6.9.4 All costs caused by noncompliant, defective, or delayed Work shall be borne by Contractor, inclusive of repair work.

6.9.5 Contractor shall not endanger any work performed by it or anyone else by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other contractor except with consent of District.

6.10 Notifications

6.10.1 Contractor shall notify the Architect and Project Inspector, in writing, of the commencement of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector. Forms are available on the DSA's website at: http://www.dgs.ca.gov/dsa/Forms.aspx.

6.10.2 Contractor shall notify the Architect and Project Inspector, in writing, of the completion of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or current version) to the Project Inspector.

6.11 Obtaining of Permits, Licenses and Registrations

Contractor shall secure and pay for all permits (except DSA), licenses, registrations, approvals and certificates necessary for prosecution of Work, including but not limited to those listed in the Special Conditions, if any, before the date of the commencement of the Work or before the permits, licenses, registrations, approvals and certificates are legally required to continue the Work without interruption. The Contractor shall obtain and pay, only when legally required, for all licenses, registrations, approvals, permits, inspections, and inspection certificates required to be obtained from or issued by any authority having jurisdiction over any part of the Work included in the Contract. All final permits, licenses, registrations, approvals and certificates shall be delivered to District before demand is made for final payment.

6.12 Royalties and Patents

6.12.1 Contractor shall obtain and pay, only when legally required, all royalties and license fees necessary for prosecution of Work before the earlier of the date of the commencement of the Work or the date that the license is legally required to continue the Work without interruption. Contractor shall defend suits or claims of infringement of patent, copyright, or other rights and shall hold the District, the Architect, and the Construction Manager harmless and indemnify them from loss on account thereof except when a particular design, process, or make or model of product is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a patent or copyright, the Contractor shall indemnify and defend the District, Architect and Construction Manager against any loss or damage unless the Contractor promptly informs the District of its information.

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

6.13 Work to Comply With Applicable Laws and Regulations

6.13.1 Contractor shall give all notices and comply with the following specific laws, ordinances, rules, and regulations and all other applicable laws, ordinances, rules, and regulations bearing on conduct of Work as indicated and specified, including but not limited to the appropriate statutes and administrative code sections. If Contractor observes that Drawings and Specifications are at variance therewith, or should Contractor become aware of the development of conditions not covered by Contract Documents that may result in finished Work being at variance therewith, Contractor shall promptly notify District in writing and any changes deemed necessary by District shall be made as provided in Contract for changes in Work.

6.13.1.1 National Electrical Safety Code, U. S. Department of Commerce

6.13.1.2 National Board of Fire Underwriters' Regulations

6.13.1.3 International Building Code, latest addition, and the California Code of Regulations, title 24, and other amendments

6.13.1.4 Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America

6.13.1.5 Industrial Accident Commission's Safety Orders, State of California

6.13.1.6 Regulations of the State Fire Marshall (title 19, California Code of Regulations) and Pertinent Local Fire Safety Codes

6.13.1.7 Americans with Disabilities Act

6.13.1.8 Education Code of the State of California

6.13.1.9 Government Code of the State of California

6.13.1.10 Labor Code of the State of California, division 2, part 7, Public Works and Public Agencies

6.13.1.11 Public Contract Code of the State of California

6.13.1.12 California Art Preservation Act

6.13.1.13 U. S. Copyright Act

6.13.1.14 U. S. Visual Artists Rights Act

6.13.2 Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act (Public Resources Code section 21000 et seq.).

6.13.3 If Contractor performs any Work that it knew, or through exercise of reasonable care should have known, to be contrary to any applicable laws, ordinance, rules, or regulations, Contractor shall bear all costs arising therefrom and arising from the correction of said Work.

6.13.4 Where Specifications or Drawings state that materials, processes, or procedures must be approved by the DSA, State Fire Marshall, or other body or agency, Contractor shall be responsible for satisfying requirements of such bodies or agencies applicable at the time the Work is performed, and as determined by those bodies or agencies.

6.14 Safety/Protection of Persons and Property

6.14.1 The Contractor will be solely and completely responsible for conditions of the Work Site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours.

6.14.2 The wearing of hard hats will be mandatory at all times for all personnel on Site. Contractor shall supply sufficient hard hats to properly equip all employees and visitors.

6.14.3 Any construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work Site.

6.14.4 Implementation and maintenance of safety programs shall be the sole responsibility of the Contractor.

6.14.5 The Contractor shall furnish to the District a copy of the Contractor's safety plan within the time frame indicated in the Contract Documents and specifically adapted for the Project.

6.14.6 Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and completion and final acceptance by District. All Work shall be solely at Contractor's risk with the exception of damage to the Work caused by "acts of God" as defined in Public Contract Code section 7105.

6.14.7 Contractor shall take, and require Subcontractors to take, all necessary precautions for safety of workers on the Project and shall comply with all applicable federal, state, local, and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. Contractor shall furnish, erect, and properly maintain at all times, all necessary safety devices, safeguards, construction canopies, signs, nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction.

6.14.8 Hazards Control – Contractor shall store volatile wastes in covered metal containers and remove them from the Site daily. Contractor shall prevent accumulation of wastes that create hazardous conditions. Contractor shall provide adequate ventilation during use of volatile or noxious substances.

6.14.9 Contractor shall designate a responsible member of its organization on the Project, whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. Name and position of person so designated shall be reported to District by Contractor.

6.14.10 Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, Contractor shall correct such violation promptly.

6.14.11 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

6.14.12 In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization, shall act, at its discretion, to prevent such threatened loss or injury. Any compensation claimed by Contractor on account of emergency work shall be determined by agreement.

6.14.13 All salvage materials will become the property of the Contractor and shall be removed from the Site unless otherwise called for in the Contract Documents. However, the District reserves the right to designate certain items of value that shall be turned over to the District unless otherwise directed by District.

6.14.14 All connections to public utilities and/or existing on-site services shall be made and maintained in such a manner as to not interfere with the continuing use of same by the District during the entire progress of the Work.

6.14.15 Contractor shall provide such heat, covering, and enclosures as are necessary to protect all Work, materials, equipment, appliances, and tools against damage by weather conditions, such as extreme heat, cold, rain, snow, dry winds, flooding, or dampness.

6.14.16 The Contractor shall protect and preserve the Work from all damage or accident, providing any temporary roofs, window and door coverings, boxings, or other construction as required by the Architect. The Contractor shall be responsible for existing structures, walks, roads, trees, landscaping, and/or improvements in working areas; and shall provide adequate protection therefore. If temporary removal is necessary of any of the above items, or damage occurs due to the Work, the Contractor shall replace same at his expense with same kind, quality, and size of Work or item damaged. This shall include any adjoining property of the District and others.

6.14.17 Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property, and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations.

6.14.18 Contractor shall confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits, or directions of Architect, and shall not interfere with the Work or unreasonably encumber Premises or overload any structure with materials. Contractor shall enforce all instructions of District and Architect regarding signs, advertising, fires, and smoking, and require that all workers comply with all regulations while on Project Site.

6.14.19 Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, or any person associated with the Work shall conduct themselves in a manner appropriate for a school site. No verbal or physical contact with neighbors, students, and faculty, profanity, or inappropriate attire or behavior will be permitted. District may require Contractor to permanently remove non-complying persons from Project Site.

6.14.20 Contractor shall take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed, Contractor shall have a civil engineer, registered as a professional engineer in California, replace them at no cost to District.

6.14.21 In the event that the Contractor enters into any agreement with owners of any adjacent property to enter upon the adjacent property for the purpose of performing the Work, Contractor shall fully indemnify, defend, and hold harmless each person, entity, firm, or agency that owns or has any interest in adjacent property. The form and content of the agreement of indemnification shall be

approved by the District prior to the commencement of any Work on or about the adjacent property. The Contractor shall also indemnify the District as provided in the indemnification provision herein. These provisions shall be in addition to any other requirements of the owners of the adjacent property.

6.15 Working Evenings and Weekends

Contractor may be required to work increased hours, evenings, and/or weekends at no additional cost to the District. Contractor shall give the District seventy-two (72) hours' notice prior to performing any evening and/or weekend work. Contractor shall perform all evening and/or weekend work only upon District's approval and in compliance with all applicable rules, regulations, laws, and local ordinances including, without limitation, all noise and light limitations. Contractor shall reimburse the District for any increased or additional Inspector charges as a result of Contractor's increased hours, or evening and/or weekend work.

6.16 Cleaning Up

6.16.1 The Contractor shall provide all services, labor, materials, and equipment necessary for protecting and securing the Work, all school occupants, furnishings, equipment, and building structure from damage until its completion and final acceptance by District. Dust barriers shall be provided to isolate dust and dirt from construction operations. At completion of the Work and portions thereof, Contractor shall clean to the original state any areas beyond the Work area that become dust laden as a result of the Work. The Contractor must erect the necessary warning signs and barricades to ensure the safety of all school occupants. The Contractor at all times must maintain good housekeeping practices to reduce the risk of fire damage and must make a fire extinguisher, fire blanket, and/or fire watch, as applicable, available at each location where cutting, braising, soldering, and/or welding is being performed or where there is an increased risk of fire.

6.16.2 Contractor at all times shall keep Premises, including property immediately adjacent thereto, free from debris such as waste, rubbish (including personal rubbish of workers, e.g., food wrappers, etc.), and excess materials and equipment caused by the Work. Contractor shall not leave debris under, in, or about the Premises (or surrounding property or neighborhood), but shall promptly remove same from the Premises on a daily basis. If Contractor fails to clean up, District may do so and the cost thereof shall be charged to Contractor. If Contract is for work on an existing facility, Contractor shall also perform specific clean-up on or about the Premises upon request by the District as it deems necessary for the continuing education process. Contractor shall comply with all related provisions of the Specifications.

6.16.3 If the Construction Manager, Architect, or District observes the accumulation of trash and debris, the District will give the Contractor a 24-hour written notice to mitigate the condition.

6.16.4 Should the Contractor fail to perform the required clean-up, or should the clean-up be deemed unsatisfactory by the District, the District will then perform the clean-up. All cost associated with the clean-up work (including all travel, payroll burden, and costs for supervision) will be deducted from the Contract Price, or District may withhold those amounts from payment(s) to Contractor.

7. SUBCONTRACTORS

7.1 Contractor shall provide the District with information for all Subcontracts as indicated in the Contractor's Submittals and Schedules Section herein.

7.2 No contractual relationship exists between the District and any Subcontractor, supplier, or sub-subcontractor by reason of this Contract.

7.3 Contractor agrees to bind every Subcontractor by terms of this Contract as far as those terms that are applicable to Subcontractor's work including, without limitation, all labor, wage & hour, apprentice and related provisions and requirements. If Contractor shall subcontract any part of this Contract, Contractor shall be as fully responsible to District for acts and omissions of any Subcontractor and of persons either directly or indirectly employed by any Subcontractor, including Subcontractor caused Project delays, as it is for acts and omissions of persons directly employed by Contractor. The divisions or sections of the Specifications and/or the arrangement of the drawings are not intended to control the Contractor in dividing the Work among Subcontractors or limit the work performed by any trade.

7.4 District's consent to, or approval of, or failure to object to, any Subcontractor under this Contract shall not in any way relieve Contractor of any obligations under this Contract and no such consent shall be deemed to waive any provisions of this Contract.

7.5 Contractor is directed to familiarize itself with sections 4100 through 4114 of the Public Contract Code of the State of California, as regards subletting and subcontracting, and to comply with all applicable requirements therein. In addition, Contractor is directed to familiarize itself with sections 1720 through 1861 of the Labor Code of the State of California, as regards the payment of prevailing wages and related issues, and to comply with all applicable requirements therein including, without limitation, section 1775 and the Contractor's and Subcontractors' obligations and liability for violations of prevailing wage law and other applicable laws.

7.6 No Contractor whose Bid is accepted shall, without consent of the awarding authority and in full compliance with section 4100 et seq. of the Public Contract Code, including, without limitation, sections 4107, 4107.5, and 4109 of the Public Contract Code, and section 1771.1 of the Labor Code, either:

7.6.1 Substitute any person as a Subcontractor in place of the Subcontractor designated in the original Bid; or

7.6.2 Permit any Subcontract to be assigned or transferred, or allow any portion of the Work to be performed by anyone other than the original Subcontractor listed in the Bid; or

7.6.3 Sublet or subcontract any portion of the Work in excess of one-half of one percent (0.5%) of the Contractor's total bid as to which his original bid did not designate a Subcontractor.

7.7 The Contractor shall be responsible for the coordination of the trades, Subcontractors, sub-subcontractors, and material or equipment suppliers working on the Project.

7.7.1 If the Contract is valued at $1 million or more and uses, or plans to use, state bond funds, then Contractor is responsible for ensuring that first tier Subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and/or C-46 licenses are prequalified by the District to work on the Project pursuant to Public Contract Code section 20111.6.

7.7.2 Contractor is responsible for ensuring that all Subcontractors are properly registered as public works contractors by the Department of Industrial Relations.

7.8 Contractor is solely responsible for settling any differences between the Contractor and its Subcontractor(s) or between Subcontractors.

7.9 Contractor must include in all of its subcontracts the assignment provisions as indicated in the Termination section of these General Conditions.

8. OTHER CONTRACTS/CONTRACTORS

8.1 District reserves the right to let other contracts, and/or to perform work with its own forces, in connection with the Project. Contractor shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly coordinate and connect Contractor's Work with the work of other contractors.

8.2 In addition to Contractor's obligation to protect its own Work, Contractor shall protect the work of any other contractor that Contractor encounters while working on the Project.

8.3 If any part of Contractor's Work depends for proper execution or results upon work of District or any other contractor, the Contractor shall inspect and, before proceeding with its Work, promptly report to the District in writing any defects in District's or any other contractor's work that render Contractor's Work unsuitable for proper execution and results. Contractor shall be held accountable for damages to District for District's or any other contractor's work that Contractor failed to inspect or should have inspected. Contractor's failure to inspect and report shall constitute Contractor's acceptance of all District's or any other contractor's work as fit and proper for reception of Contractor's Work, except as to defects that may develop in District's or any other contractor's work after execution of Contractor's Work and not caused by execution of Contractor's Work.

8.4 To ensure proper execution of its subsequent work, Contractor shall measure and inspect work already in place and shall at once report to the District in writing any discrepancy between that executed work and the Contract Documents.

8.5 Contractor shall ascertain to its own satisfaction the scope of the Project and nature of District's or any other contracts that have been or may be awarded by District in prosecution of the Project to the end that Contractor may perform this Contract in light of the other contracts, if any.

8.6 Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy of the Site, the Premises, or of the Project. Contractor shall not cause any unnecessary hindrance or delay to the use and/or school operation(s) of the Premises and/or to District or any other contractor working on the Project. If simultaneous execution of any contract or school operation is likely to cause interference with performance of Contractor's Contract, Contractor shall coordinate with those contractor(s), person(s), and/or entity(s) and shall notify the District of the resolution.

9. DRAWINGS AND SPECIFICATIONS

9.1 A complete list of all Drawings that form a part of the Contract is to be found as an index on the Drawings themselves, and/or may be provided to the Contractor and/or in the Table of Contents.

9.2 Materials or Work described in words that so applied have a well-known technical or trade meaning shall be deemed to refer to recognized standards, unless noted otherwise.

9.3 Trade Name or Trade Term. It is not the intention of this Contract to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term." The mere mention or notation of "trade name" or "trade term" shall be considered a sufficient notice to Contractor that it will be required to complete the work so named, complete, finished, and operable, with all its appurtenances, according to the best practices of the trade.

9.4 The naming of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor therefor, as per best practices of the trade(s) involved, unless specifically noted otherwise.

9.5 Contract Documents are complementary, and what is called for by one shall be binding as if called for by all. As such, Drawings and Specifications are intended to be fully cooperative and to agree. However, if Contractor observes that Drawings and Specifications are in conflict with the Contract Documents, Contractor shall promptly notify District and Architect in writing, and any necessary changes shall be made as provided in the Contract Documents.

9.6 In the case of discrepancy or ambiguity in the Contract Documents, the order of precedence in the Agreement shall prevail. However, in the case of discrepancy or ambiguity solely between and among the Drawings and Specifications, the discrepancy or ambiguity shall be resolved in favor of the interpretation that will provide District with the functionally complete and operable Project described in the Drawings and Specifications. In case of ambiguity, conflict, or lack of information, District will furnish clarifications with reasonable promptness.

9.7 Drawings and Specifications are intended to comply with all laws, ordinances, rules, and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, the laws, ordinances, rules, and regulations shall be considered as a part of the Contract within the limits specified. Contractor shall bear all expense of correcting work done contrary to said laws, ordinances, rules, and regulations.

9.8 As required by Section 4-317(c), Part 1, Title 24, CCR: "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, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work."

9.9 Ownership of Drawings

All copies of Plans, Drawings, Designs, Specifications, and copies of other incidental architectural and engineering work, or copies of other Contract Documents furnished by District, are the property of District. They are not to be used by Contractor in other work and, with the exception of signed sets of Contract Documents, are to be returned to District on request at completion of Work, or may be used by District as it may require without any additional costs to District. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect. District hereby grants the Contractor, Subcontractors, sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings prepared for the Project in the execution of their Work under the Contract Documents.

10. CONTRACTOR'S SUBMITTALS AND SCHEDULES

Contractor's submittals shall comply with the provisions and requirements of the Specifications including, without limitation Submittals.

10.1 Schedule of Work, Schedule of Submittals, and Schedule of Values

10.1.1 Within **TEN (10)** calendar days after the date of the Notice to Proceed (unless otherwise specified in the Specifications), the Contractor shall prepare and submit to the District for review, in a form supported by sufficient data to substantiate its accuracy as the District may require:

10.1.1.1 Preliminary Schedule. A preliminary schedule of construction indicating the starting and completion dates of the various stages of the Work, including any information and following any form as may be specified in the Specifications. Once approved by District, this shall become the Construction Schedule. This schedule shall include and identify all tasks that are on the Project's critical path with a specific determination of the start and completion of each critical path task as well as all Contract milestones and each milestone's completion date(s) as may be required by the District.

10.1.1.1.1 The District is not required to approve a preliminary schedule of construction with early completion, i.e., one that shows early completion dates for the Work and/or milestones. Contractor shall not be entitled to extra compensation if the District approves a Construction Schedule with an early completion date and Contractor completes the Project beyond the date shown in the schedule but within the Contract Time. A Construction Schedule showing the Work completed in less than the Contract Time, the time between the early completion date and the end of the Contract Time shall be Float.

10.1.1.2 Preliminary Schedule of Values. A preliminary schedule of values for all of the Work, which must include quantities and prices of items aggregating the Contract Price and must subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Unless the Special Conditions contain different limits, this preliminary schedule of values shall include, at a minimum, the following information and the following structure:

10.1.1.2.1 Divided into at least the following categories:

10.1.1.2.1.1 Overhead and profit;
10.1.1.2.1.2 Supervision;
10.1.1.2.1.3 General conditions;
10.1.1.2.1.4 Layout;
10.1.1.2.1.5 Mobilization;
10.1.1.2.1.6 Submittals;
10.1.1.2.1.7 Bonds and insurance;
10.1.1.2.1.8 Close-out/Certification documentation;
10.1.1.2.1.9 Demolition;
10.1.1.2.1.10 Installation;
10.1.1.2.1.11 Rough-in;
10.1.1.2.1.12 Finishes;
10.1.1.2.1.13 Testing;
10.1.1.2.1.14 Punchlist and District acceptance.

10.1.1.2.2 And also divided by each of the following areas:

10.1.1.2.2.1 Site work;
10.1.1.2.2.2 By each building;
10.1.1.2.2.3 By each floor.

10.1.1.2.3 The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

10.1.1.2.3.1 Mobilization and layout combined to equal not more than 1%;
10.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than 3%;
10.1.1.2.3.3 Bonds and insurance combined to equal not more than 2%.

10.1.1.2.4 Closeout documentation shall have a value in the preliminary schedule of not less than 5%.

10.1.1.2.5 Notwithstanding any provision of the Contract Documents to the contrary, payment of the Contractor's overhead, supervision, general conditions costs, and profit, as reflected in the Cost Breakdown, shall be paid based on percentage complete, with the disbursement of Progress Payments and the Final Payment.

10.1.1.2.6 Contractor shall certify that the preliminary schedule of values as submitted to the District is accurate and reflects the costs as developed in preparing Contractor’s bid. For example, without limiting the foregoing,

Contractor shall not "front-load" the preliminary schedule of values with dollar amounts greater than the value of activities performed early in the Project.

10.1.1.2.7 The preliminary schedule of values shall be subject to the District's review and approval of the form and content thereof. In the event that the District objects to any portion of the preliminary schedule of values, the District shall notify the Contractor, in writing, of the District's objection(s) to the preliminary schedule of values. Within five (5) calendar days of the date of the District's written objection(s), Contractor shall submit a revised preliminary schedule of values to the District for review and approval. The foregoing procedure for the preparation, review and approval of the preliminary schedule of values shall continue until the District has approved the entirety of the preliminary schedule of values.

10.1.1.2.8 Once the preliminary schedule of values is approved by the District, this shall become the Schedule of Values. The Schedule of Values shall not be thereafter modified or amended by the Contractor without the prior consent and approval of the District, which may be granted or withheld in the sole discretion of the District.

10.1.1.3 Preliminary Schedule of Submittals. A preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals. Once approved by District, this shall become the Submittal Schedule. All submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those submittals shall be forwarded to the District so as not to delay the Construction Schedule. Upon request by the District, Contractor shall provide an electronic copy of all submittals to the District. All submittals shall be submitted no later than 90 days after the Notice to Proceed.

10.1.1.4 Safety Plan. Contractor's Safety Plan specifically adapted for the Project. Contractor's Safety Plan shall comply with the following requirements:

10.1.1.4.1 All applicable requirements of California Division of Occupational Safety and Health ("CalOSHA") and/or of the United States Occupational Safety and Health Administration ("OSHA").

10.1.1.4.2 All provisions regarding Project safety, including all applicable provisions in these General Conditions.

10.1.1.4.3 Contractor's Safety Plan shall be in English and in the language(s) of the Contractor's and its Subcontractors' employees.

10.1.1.5 Complete Registered Subcontractors List. The name, address, telephone number, facsimile number, California State Contractors License number, classification, DIR registration number and monetary value of all Subcontracts of any tier for parties furnishing labor, material, or equipment for completion of the Project.

10.1.2 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.1.3 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.1.4 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.1.5 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.2 Monthly Progress Schedule(s)

10.2.1 Contractor shall provide Monthly Progress Schedule(s) to the District. A Monthly Progress Schedule shall update the approved Construction Schedule or the last Monthly Progress Schedule, showing all work completed and to be completed as well as updating the Registered Subcontractors List. The monthly Progress Schedule shall be sent within the timeframe requested by the District and shall be in a format acceptable to the District and contain a written narrative of the progress of work that month and any changes, delays, or events that may affect the work. The process for District approval of the Monthly Progress Schedule shall be the same as the process for approval of the Construction Schedule.

10.2.2 Contractor shall submit Monthly Progress Schedule(s) with all payment applications.

10.2.3 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.2.4 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.2.5 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.2.6 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.3 Material Safety Data Sheets (MSDS)

Contractor is required to ensure Material Safety Data Sheets are available in a readily accessible place at the Work Site for any material requiring a Material Safety Data Sheet per the federal "Hazard Communication" standard, or employees' "right to know" law. The Contractor is also required to ensure proper labeling on substances brought onto the job site and that any person working with the material or within the general area of the material is informed of the hazards of the substance and follows proper handling and protection procedures. Two additional copies of the Material Safety Data Sheets shall also be submitted directly to the District.

11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS

11.1 Site Investigation

Before bidding on this Work, Contractor shall make a careful investigation of the Site and thoroughly familiarize itself with the requirements of the Contract. By the act of submitting a bid for the Work included in this Contract, Contractor shall be deemed to have made a complete study and investigation, and to be familiar with and accepted the existing conditions of the Site.

Prior to commencing the Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey. This electronic record shall serve as a basis for determining any damages caused by the Contractor during the Project. The Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

11.2 Soils Investigation Report

11.2.1 When a soils investigation report obtained from test holes at Site or for the Project is available, that report may be available to the Contractor but shall not be a part of this Contract and shall not alleviate or excuse the Contractor's obligation to perform its own investigation. Any information obtained from that report or any information given on Drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, does not form a part of this Contract, and Contractor may not rely thereon. By submitting its bid, Contractor acknowledges that it has made visual examination of Site and has made whatever tests Contractor deems appropriate to determine underground condition of soil.

11.2.2 Contractor agrees that no claim against District will be made by Contractor for damages and hereby waives any rights to damages if, during progress of Work, Contractor encounters subsurface or latent conditions at Site materially differing from those shown on Drawings or indicated in Specifications, or for unknown conditions of an unusual nature that differ materially from those ordinarily encountered in the work of the character provided for in Plans and Specifications, except as indicated in the provisions of these General Conditions regarding trenches, trenching, and/or existing utility lines.

11.3 Access to Work

District and its representatives shall at all times have access to Work wherever it is in preparation or progress, including storage and fabrication. Contractor shall provide safe and proper facilities for such access so that District's representatives may perform their functions.

11.4 Layout and Field Engineering

11.4.1 All field engineering required for layout of this Work and establishing grades for earthwork operations shall be furnished by Contractor at its expense. This Work shall be done by a qualified, California-registered civil engineer approved

in writing by District and Architect. Any required Record and/or As-Built Drawings of Site development shall be prepared by the approved civil engineer.

11.4.2 The Contractor shall be responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the Site and for having satisfied itself as to the conditions under which the Work is to be performed. Contractor shall follow best practices, including but not limited to potholing to avoid utilities. District shall not be liable for any claim for allowances because of Contractor's error, failure to follow best practices, or negligence in acquainting itself with the conditions at the Site.

11.4.3 Contractor shall protect and preserve established benchmarks and monuments and shall make no changes in locations without the prior written approval of District. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of District and with District's approval.

11.5 Utilities

Utilities shall be provided as indicated in the Specifications.

11.6 Sanitary Facilities

Sanitary facilities shall be provided as indicated in the Specifications.

11.7 Surveys

Contractor shall provide surveys done by a California-licensed civil engineer surveyor to determine locations of construction, grading, and site work as required to perform the Work.

11.8 Regional Notification Center

The Contractor, except in an emergency, shall contact the appropriate regional notification center at least two (2) days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement that is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the District, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and/or carried out by the Contractor unless an inquiry identification number has been assigned to the Contractor or any Subcontractor and the Contractor has given the District the identification number. Any damages arising from Contractor's failure to make appropriate notification shall be at the sole risk and expense of the Contractor. Any delays caused by failure to make appropriate notification shall be at the sole risk of the Contractor and shall not be considered for an extension of the Contract Time.

11.9 Existing Utility Lines

11.9.1 Pursuant to Government Code section 4215, District assumes the responsibility for removal, relocation, and protection of main or trunk utility lines and facilities located on the construction Site at the time of commencement of construction under this Contract with respect to any such utility facilities that are not identified in the Plans and Specifications. Contractor shall not be assessed for

liquidated damages for delay in completion of the Project caused by failure of District or the owner of a utility to provide for removal or relocation of such utility facilities.

11.9.2 Locations of existing utilities provided by District shall not be considered exact, but approximate within a reasonable margin and shall not relieve Contractor of responsibilities to exercise reasonable care or costs of repair due to Contractor's failure to do so. District shall compensate Contractor for the costs of locating, repairing damage not due to the failure of Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment necessarily idle during such work.

11.9.3 No provision herein shall be construed to preclude assessment against Contractor for any other delays in completion of the Work. Nothing in this Article shall be deemed to require District to indicate the presence of existing service laterals, appurtenances, or other utility lines, within the exception of main or trunk utility lines or whenever the presence of these utilities on the Site of the construction Project can be inferred from the presence of other visible facilities, such as buildings, meter junction boxes, on or adjacent to the Site of the construction.

11.9.4 If Contractor, while performing Work under this Contract, discovers utility facilities not identified by District in Contract Plans and Specifications, Contractor shall immediately notify the District and the utility in writing. The cost of repair for damage to above-mentioned visible facilities without prior written notification to the District shall be borne by the Contractor.

11.10 Notification

Contractor understands, acknowledges and agrees that the purpose for prompt notification to the District pursuant to these provisions is to allow the District to investigate the condition(s) so that the District shall have the opportunity to decide how the District desires to proceed as a result of the condition(s). Accordingly, failure of Contractor to promptly notify the District in writing, pursuant to these provisions, shall constitute Contractor's waiver of any claim for damages or delay incurred as a result of the condition(s).

11.11 Hazardous Materials

Contractor shall comply with all provisions and requirements of the Contract Documents related to hazardous materials including, without limitation, Hazardous Materials Procedures and Requirements.

11.12 No Signs

Neither the Contractor nor any other person or entity shall display any signs not required by law or the Contract Documents at the Site, fences trailers, offices, or elsewhere on the Site without specific prior written approval of the District.

12. TRENCHES

12.1 Trenches Greater Than Five Feet

Pursuant to Labor Code section 6705, if the Contract Price exceeds $25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, promptly submit to the District and/or a registered civil or structural engineer employed by the District or Architect, a detailed plan, stamped by a licensed engineer retained by the Contractor, showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

12.2 Excavation Safety

If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted by the District or by the person to whom authority to accept has been delegated by the District.

12.3 No Tort Liability of District

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the District or any of its employees.

12.4 No Excavation without Permits

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CalOSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

12.5 Discovery of Hazardous Waste and/or Unusual Conditions

12.5.1 Pursuant to Public Contract Code section 7104, if the Work involves digging trenches or other excavations that extend deeper than four feet below the Surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any:

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

12.5.1.2 Subsurface or latent physical conditions at the Site differing from those indicated.

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

12.5.2 The District shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work, shall issue a Change Order under the procedures described herein.

12.5.3 In the event that a dispute arises between District and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law that pertain to the resolution of disputes and protests.

13. INSURANCE AND BONDS

13.1 Insurance

Unless different provisions and/or limits are indicated in the Special Conditions, all insurance required of Contractor and/or its Subcontractor(s) shall be in the amounts and include the provisions set forth herein.

13.1.1 Commercial General Liability and Automobile Liability Insurance

13.1.1.1 Contractor shall procure and maintain, during the life of this Contract, Commercial General Liability Insurance and Automobile Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, personal injury, death, advertising injury, and medical payments arising from, or in connection with, operations under this Contract. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 0001 11188. Contractor shall ensure that Products Liability and Completed Operations coverage, Fire Damage Liability coverage, and Automobile Liability Insurance coverage including owned, non-owned, and hired automobiles, are included within the above policies and at the required limits, or Contractor shall procure and maintain these coverages separately.

13.1.1.2 Contractor's deductible or self-insured retention for its Commercial General Liability Insurance policy shall not exceed $25,000 unless approved in writing by District.

13.1.1.3 All such policies shall be written on an occurrence form.

13.1.2 Excess Liability Insurance

13.1.2.1 If Contractor's underlying policy limits are less than required, subject to 13.1.2.3[A1] below, Contractor may procure and maintain, during the life of this Contract, an Excess Liability Insurance Policy to meet the policy limit requirements of the required policies in order to satisfy, in the aggregate with its underlying policy, the insurance requirements herein..

13.1.2.2 There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the Excess Liability Insurance Policy. Any Excess Liability Insurance Policy shall be written on a following form and shall protect Contractor, District, State, Construction Manager(s), Project Manager(s), and Architect(s) in amounts and including the provisions as set forth in the Supplementary Conditions (if any) and/or Special Conditions, and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.

13.1.2.3 The District, in its sole discretion, may accept the Excess Liability Insurance Policy that brings Contractor's primary limits to the minimum requirements herein.

13.1.3 Subcontractor(s): Contractor shall require its Subcontractor(s), if any, to procure and maintain Commercial General Liability Insurance, Automobile Liability Insurance, and Excess Liability Insurance (if Subcontractor elects to satisfy, in part the insurance required herein by procuring and maintaining an Excess Liability Insurance Policy) with forms of coverage and limits equal to the amounts required of the Contractor.

13.1.4 Workers' Compensation and Employers' Liability Insurance

13.1.4.1 In accordance with provisions of section 3700 of the California Labor Code, the Contractor and every Subcontractor shall be required to secure the payment of compensation to its employees.

13.1.4.2 Contractor shall procure and maintain, during the life of this Contract, Workers' Compensation Insurance and Employers' Liability Insurance for all of its employees engaged in work under this Contract, on/or at the Site of the Project. This coverage shall cover, at a minimum, medical and surgical treatment, disability benefits, rehabilitation therapy, and survivors' death benefits. Contractor shall require its Subcontractor(s), if any, to procure and maintain Workers' Compensation Insurance and Employers' Liability Insurance for all employees of Subcontractor(s). Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by Contractor's insurance. If any class of employee or employee engaged in Work under this Contract, on or at the Site of the Project, is not protected under the Workers' Compensation Insurance, Contractor shall provide, or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of any employee(s) not otherwise protected before any of those employee(s) commence work.

13.1.5 Builder's Risk Insurance: Builder's Risk "All Risk" Insurance

Contractor shall procure and maintain, during the life of this Contract, Builder's Risk (Course of Construction), or similar first party property coverage acceptable to the District, issued on a replacement cost value basis. The cost shall be consistent with the total replacement cost of all insurable Work of the Project included within the Contract Documents. Coverage is to insure against all risks of accidental physical loss and shall include without limitation the perils of vandalism and/or malicious mischief (both without any limitation regarding vacancy or occupancy), sprinkler leakage, civil authority, theft, sonic disturbance, earthquake, flood, collapse, wind, rain, dust, fire, war, terrorism, lightning, smoke, and rioting. Coverage shall include debris removal, demolition, increased costs due to enforcement of all applicable

ordinances and/or laws in the repair and replacement of damaged and undamaged portions of the property, and reasonable costs for the Architect's and engineering services and expenses required as a result of any insured loss upon the Work and Project, including completed Work and Work in progress, to the full insurable value thereof.

13.1.6 Pollution Liability Insurance

13.1.6.1 Contractor shall procure and maintain Pollution Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Contract, and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. This coverage shall be provided in a form at least as broad as Insurance Services Offices, Inc. (ISO) Form CG 2415, or Contractor shall procure and maintain these coverages separately.

13.1.6.2 Contractor warrants that any retroactive date applicable to coverage under the policy shall predate the effective date of the Contract and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Contract is completed.

13.1.6.3 If Contractor is responsible for removing any pollutants from a site, then Contractor shall ensure that Any Auto, including owned, non-owned, and hired, is included within the above policies and at the required limits, to cover its automobile exposure from transporting the pollutants from the site to an approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

13.1.7 Proof of Insurance and Other Requirements: Endorsements and Certificates

13.1.7.1 Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract, until Contractor and its Subcontractor(s) have procured all required insurance and Contractor has delivered in duplicate to the District complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the District has approved these documents.

13.1.7.2 Endorsements, certificates, and insurance policies shall include the following:

13.1.7.2.1 A clause stating the following, or other language acceptable to the District:

"This policy shall not be canceled until written notice to District, Architect, and Construction Manager stating date of the cancellation by the insurance

carrier. Date of cancellation may not be less than thirty (30) days after date of mailing notice."

13.1.7.2.2 Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation and reduction notice will be sent, and length of notice period.

13.1.7.2.3 All endorsements, certificates and insurance policies shall state that District, its trustees, employees and agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s) and Architect(s) are named additional insureds under all policies except Workers' Compensation Insurance and Employers' Liability Insurance.

13.1.7.3 No policy shall be amended, canceled or modified, and the coverage amounts shall not be reduced, until Contractor or Contractor's broker has provided written notice to District, Architect(s), and Construction Manager(s) stating date of the amendment, modification, cancellation or reduction, and a description of the change. Date of amendment, modification, cancellation or reduction may not be less than thirty (30) days after date of mailing notice.

13.1.7.4 Insurance written on a "claims made" basis shall be retroactive to a date that coincides with or precedes Contractor's commencement of Work, including subsequent policies purchased as renewals or replacements. Said policy is to be renewed by the Contractor and all Subcontractors for a period of five (5) years following completion of the Work or termination of this Agreement. Such insurance must have the same coverage and limits as the policy that was in effect during the term of this Agreement, and will cover the Contractor and all Subcontractors for all claims made.

13.1.7.5 Contractor's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by District, its trustees, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

13.1.7.6 All endorsements shall waive any right to subrogation against any of the named additional insureds.

13.1.7.7 Unless otherwise stated in the Special Conditions, all of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than **A: VII**.

13.1.7.8 The insurance requirements set forth herein shall in no way limit the Contractor's liability arising out of or relating to the performance of the Work or related activities.

13.1.7.9 Failure of Contractor and/or its Subcontractor(s) to comply with the insurance requirements herein shall be deemed a material breach of the Contract.

13.1.8 Insurance Policy Limits[A2]

Unless different limits are indicated in the Special Conditions, the limits of insurance shall not be less than the following amounts:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	$2,000,000 per occurrence; $4,000,000 aggregate
Automobile Liability	Any Auto – Combined Single Limit	$1,000,000
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		$1,000,000
Builder's Risk (Course of Construction)		Issued for the value and scope of Work indicated herein.
Pollution Liability		$1,000,000 per claim; $2,000,000 aggregate

13.2 Contract Security - Bonds

13.2.1 Contractor shall furnish two surety bonds issued by a California admitted surety insurer as follows:

13.2.1.1 Performance Bond: A bond in an amount at least equal to one hundred percent (100%) of Contract Price as security for faithful performance of this Contract.

13.2.1.2 Payment Bond: A bond in an amount at least equal to one hundred percent (100%) of the Contract Price as security for payment of persons performing labor and/or furnishing materials in connection with this Contract.

13.2.2 Cost of bonds shall be included in the Bid and Contract Price.

13.2.3 All bonds related to this Project shall be in the forms set forth in these Contract Documents and shall comply with all requirements of the Contract Documents, including, without limitation, the bond forms.

14. WARRANTY/GUARANTEE/INDEMNITY

14.1 Warranty/Guarantee

14.1.1 The Contractor shall obtain and preserve for the benefit of the District, manufacturer's warranties on materials, fixtures, and equipment incorporated into the Work.

14.1.2 In addition to guarantees required elsewhere, Contractor shall, and hereby does guarantee and warrant all Work furnished on the job against all defects for a period of **ONE (1)** year after the later of the following dates, unless a longer period is provided for in the Contract Documents:

14.1.2.1 The acceptance by the District's governing board of the Work, subject to these General Conditions, or

14.1.2.2 The date that commissioning for the Project, if any, was completed.

At the District's sole option, Contractor shall repair or replace any and all of that Work, together with any other Work that may be displaced in so doing, that may prove defective in workmanship and/or materials within a **ONE (1)** year period from date of completion as defined above, unless a longer period is provided for in the Contract Documents, without expense whatsoever to District. In the event of failure of Contractor and/or Surety to commence and pursue with diligence said replacements or repairs within ten (10) days after being notified in writing, Contractor and Surety hereby acknowledge and agree that District is authorized to proceed to have defects repaired and made good at expense of Contractor and/or Surety who hereby agree to pay costs and charges therefore immediately on demand.

14.1.3 If, in the opinion of District, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to District or to prevent interruption of operations of District, District will attempt to give the notice required above. If Contractor or Surety cannot be contacted or neither complies with District's request for correction within a reasonable time as determined by District, District may, notwithstanding the above provision, proceed to make any and all corrections and/or provide attentions the District believes are necessary. The costs of correction or attention shall be charged against Contractor and Surety of the guarantees provided in this Article or elsewhere in this Contract.

14.1.4 The above provisions do not in any way limit the guarantees on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish to District all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by District.

14.1.5 Nothing herein shall limit any other rights or remedies available to District.

14.2 Indemnity and Defense

14.2.1 To the furthest extent permitted by California law, the Contractor shall indemnify, keep and hold harmless the District, the Architect(s), and the Construction Manager(s), their respective consultants, separate contractors, board members, officers, representatives, , agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, injury, damages, losses, and expenses ("Claims"), including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers. However, the Contractor's indemnification and hold harmless obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability to the extent the Claim(s) is/are caused by the sole negligence, active negligence, or

willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction. This indemnification and hold harmless obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist or arise as to any Indemnitee or other person described herein. This indemnification and hold harmless obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the DIR.

14.2.2 To the furthest extent permitted by California law, Contractor shall also defend Indemnitees, at its own expense, including but not limited to attorneys' fees and costs, against all Claims caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers. However, the Contractor's defense obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction. The District shall have the right to accept or reject any legal representation that Contractor proposes to defend the Indemnitees. If any Indemnitee provides its own defense due to failure to timely respond to tender of defense, rejection of tender of defense, or conflict of interest of proposed counsel, Contractor shall reimburse such Indemnitee for any expenditures. Contractor's defense obligation shall not be construed to negate, abridge, or otherwise reduce any right or obligation of defense that would otherwise exist as to any Indemnitee or other person described herein. Contractor's defense obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the DIR. The Contractor shall give prompt notice to the District in the event of any Claim(s).

14.2.3 Without limitation of the provisions herein, if the Contractor's obligation to indemnify and hold harmless the Indemnitees or its obligation to defend Indemnitees as provided herein shall be determined to be void or unenforceable, in whole or in part, it is the intention of the parties that these circumstances shall not otherwise affect the validity or enforceability of the Contractor's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein. Further, the Contractor shall be and remain fully liable on its agreements and obligations herein to the fullest extent permitted by law.

14.2.4 Pursuant to Public Contract Code section 9201, the District shall provide timely notification to Contractor of the receipt of any third-party Claim relating to this Contract. The District shall be entitled to recover its reasonable costs incurred in providing said notification.

14.2.5 In any and all Claims against any of the Indemnitees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the Contractor's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

14.2.6 The District may retain so much of the moneys due the Contractor as shall be considered necessary, until disposition of any such Claims or until the District, Architect(s) and Construction Manager(s) have received written agreement from the Contractor that they will unconditionally defend the District, Architect(s) and Construction Manager(s), their respective officers, agents and employees, and pay any damages due by reason of settlement or judgment.

14.2.7 The Contractor's defense and indemnification obligations hereunder shall survive the completion of Work, the warranty/guarantee period, and the termination of the Contract.

15. TIME

15.1 Notice to Proceed

15.1.1 District may issue a Notice to Proceed within ninety (90) days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

15.1.2 In the event that the District desires to postpone issuing the Notice to Proceed beyond ninety (90) days from the date of the Notice of Award, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed.

15.1.3 If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to Contractor, Contractor may terminate the Contract. Contractor's termination due to a postponement shall be by written notice to District within ten (10) days after receipt by Contractor of District's notice of postponement. It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement. Should Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

15.2 Computation of Time / Adverse Weather

15.2.1 The Contractor will only be allowed a time extension for Adverse Weather conditions if requested by Contractor in compliance with the time extension request procedures and only if all of the following conditions are met:

15.2.1.1 The weather conditions constitute Adverse Weather, as defined herein and further specified in the Special Conditions;

15.2.1.2 Contractor can verify that the Adverse Weather caused delays in excess of five (5) hours of the indicated labor required to complete the scheduled tasks of Work on the day affected by the Adverse Weather;

15.2.1.3 The Contractor's crew is dismissed as a result of the Adverse Weather;

15.2.1.4 Said delay adversely affects the critical path in the Construction Schedule; and

15.2.1.5 Exceeds twelve (12) days of delay per year.

15.2.2 If the aforementioned conditions are met, a non-compensable day-for-day extension will only be allowed for those days in excess of those indicated in the Special Conditions.

15.2.3 The Contractor shall work seven (7) days per week, if necessary, irrespective of inclement weather, to maintain access and the Construction Schedule, and to protect the Work under construction from the effects of Adverse Weather, all at no further cost to the District.

15.2.4 The Contract Time has been determined with consideration given to the average climate weather conditions prevailing in the County in which the Project is located.

15.3 Hours of Work

15.3.1 Sufficient Forces

Contractor and Subcontractors shall continuously furnish sufficient and competent work forces with the required levels of familiarity with the Project and skill, training and experience to ensure the prosecution of the Work in accordance with the Construction Schedule.

15.3.2 Performance During Working Hours

Work shall be performed during regular working hours as permitted by the appropriate governmental agency except that in the event of an emergency, or when required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the District and approval of any required governmental agencies.

15.3.3 No Work during State Testing

Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests. The District or District's Representative will provide Contractor with a schedule of test dates concurrent with the District's issuance of the Notice to Proceed, or as soon as test dates are made available to the District.

15.4 Progress and Completion

15.4.1 Time of the Essence

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

15.4.2 No Commencement Without Insurance or Bonds

The Contractor shall not commence operations on the Project or elsewhere prior to the effective date of insurance and bonds. The date of commencement of the Work shall not be changed by the effective date of such insurance or bonds. If Contractor commences Work without insurance and bonds, all Work is performed at Contractor's peril and shall not be compensable until and unless Contractor secures bonds and insurance pursuant to the terms of the Contract Documents and subject to District claim for damages.

15.5 Schedule

Contractor shall provide to District, Construction Manager, and Architect a schedule in conformance with the Contract Documents and as required in the Notice to Proceed and the Contractor's Submittals and Schedules section of these General Conditions.

15.6 Expeditious Completion

The Contractor shall proceed expeditiously with adequate forces and shall achieve Completion within the Contract Time.

16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES

16.1 Liquidated Damages

Contractor and District hereby agree that the exact amount of damages for failure to complete the Work within the time specified is extremely difficult or impossible to determine. If the Work is not completed within the time specified in the Contract Documents, it is understood that the District will suffer damage. It being impractical and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to District as fixed and liquidated damages, and not as a penalty, the amount set forth in the Agreement for each calendar day of delay in completion. Contractor and its Surety shall be liable for the amount thereof pursuant to Government Code section 53069.85.

16.2 Excusable Delay

16.2.1 Contractor shall not be charged for liquidated damages because of any delays in completion of Work which are not the fault of Contractor or its Subcontractors, including acts of God as defined in Public Contract Code section 7105, acts of enemy, epidemics, and quarantine restrictions. Contractor shall, within five (5) calendar days of beginning of any delay, notify District in writing of causes of delay including documentation and facts explaining the delay and the direct correlation between the cause and effect. District shall review the facts and extent of any delay and shall grant extension(s) of time for completing Work when, in its

judgment, the findings of fact justify an extension. Extension(s) of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted if Contractor has timely submitted the Construction Schedule as required herein.

16.2.2 Contractor shall notify the District pursuant to the claims provisions in these General Conditions of any anticipated delay and its cause. Following submission of a claim, the District may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

16.2.3 In the event the Contractor requests an extension of Contract Time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in Work. When requesting time, requests must be submitted with full justification and documentation. If the Contractor fails to submit justification, it waives its right to a time extension at a later date. Such justification must be based on the official Construction Schedule as updated at the time of occurrence of the delay or execution of Work related to any changes to the Scope of Work. Any claim for delay must include the following information as support, without limitation:

16.2.3.1 The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform the activities within the stated duration.

16.2.3.2 Specific logical ties to the Contract Schedule for the proposed changes and/or delay showing the activity/activities in the Construction Schedule that are affected by the change and/or delay. In particular, Contractor must show an actual impact to the schedule, after making a good faith effort to mitigate the delay by rescheduling the work, by providing an analysis of the schedule ("Schedule Analysis"). Such Schedule Analysis shall describe in detail the cause and effect of the delay and the impact on the critical dates in the Project schedule. (A portion of any delay of seven (7) days or more must be provided.)

16.2.3.3 A recovery schedule must be submitted within twenty (20) calendar days of written notification to the District of causes of delay.

16.3 No Additional Compensation for Delays Within Contractor's Control

16.3.1 Contractor is aware that governmental agencies, including, without limitation, the Division of the State Architect, the Department of General Services, gas companies, electrical utility companies, water districts, and other agencies may have to approve Contractor-prepared drawings or approve a proposed installation. Accordingly, Contractor shall include in its bid, time for possible review of its drawings and for reasonable delays and damages that may be caused by such agencies. Thus, Contractor is not entitled to make a claim for damages or delays arising from the review of Contractor's drawings.

16.3.2 Contractor shall only be entitled to compensation for delay when all of the following conditions are met:

16.3.2.1 The District is responsible for the delay;

16.3.2.2 The delay is unreasonable under the circumstances involved;

16.3.2.3 The delay was not within the contemplation of the District and Contractor;

16.3.2.4 The delay could not have been avoided or mitigated by Contractor's reasonable diligence; and

16.3.2.5 Contractor timely complies with the claims procedure of the Contract Documents.

16.4 Float or Slack in the Schedule

Float or slack is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule. Float or slack is not for the exclusive use of or benefit of either the District or the Contractor, but its use shall be determined solely by the District.

17. CHANGES IN THE WORK

17.1 No Changes Without Authorization

17.1.1 There shall be no change whatsoever in the Drawings, Specifications, or in the Work without an executed Change Order or a written Construction Change Directive authorized by the District as herein provided. District shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the District's governing board has authorized the same and the cost thereof has been approved in writing by Change Order or Construction Change Directive in advance of the changed Work being performed. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted and approved in writing in the Change Order or Construction Change Directive. Contractor shall be responsible for any costs incurred by the District for professional services and DSA fees and/or delay to the Project Schedule, if any, for DSA to review any request for changes to the DSA approved plans and specifications for the convenience of the Contractor and/or to accommodate the Contractor's means and methods. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications.

17.1.2 Contractor shall perform immediately all work that has been authorized by a fully executed Change Order or Construction Change Directive. Contractor shall be fully responsible for any and all delays and/or expenses caused by Contractor's failure to expeditiously perform this Work.

17.1.3 Should any Change Order result in an increase in the Contract Price or extend the Contract Time, the cost of or length of extension in that Change Order shall be agreed to, in writing, by the District in advance of the Work by Contractor, and shall be subject to the monetary limitations set forth in Public Contract Code section 20118.4. In the event that Contractor proceeds with any change in Work without a Change Order executed by the District or Construction Change Directive, Contractor waives any claim of additional compensation or time for that additional work. Under no circumstances shall Contractor be entitled to any claim of additional

compensation or time not expressly requested by Contractor in a Proposed Change Order or approved by District in an executed Change Order.

17.1.4 Contractor understands, acknowledges, and agrees that the reason for District authorization is so that District may have an opportunity to analyze the Work and decide whether the District shall proceed with the Change Order or alter the Project so that a change in Work becomes unnecessary.

17.2 Architect Authority

The Architect will have authority to order minor changes in the Work not involving any adjustment in the Contract Price, or an extension of the Contract Time, or a change that is inconsistent with the intent of the Contract Documents. These changes shall be effected by written Change Order, Construction Change Directive, by Architect's response(s) to RFI(s), or by Architect's Supplemental Instructions ("ASI").

17.3 Change Orders

17.3.1 A Change Order is a written instrument prepared and issued by the District and/or the Architect and signed by the District (as authorized by the District's Governing Board), the Contractor, the Architect, and approved by the Project Inspector (if necessary) and DSA (if necessary), stating their agreement regarding all of the following:

17.3.1.1 A description of a change in the Work;

17.3.1.2 The amount of the adjustment in the Contract Price, if any; and

17.3.1.3 The extent of the adjustment in the Contract Time, if any.

17.4 Construction Change Directives

17.4.1 A Construction Change Directive is a written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work. The District may, as provided by law, by Construction Change Directive and without invalidating the Contract, order changes in the Work consisting of additions, deletions, or other revisions. The adjustment to the Contract Price or Time, if any, is subject to the provisions of this section regarding Changes in the Work. If all or a portion of the Project is being funded by funds requiring approval by the State Allocation Board ("SAB"), these revisions may be subject to compensation once approval of same is received and funded by the SAB, and funds are released by the Office of Public School Construction ("OPSC"). Any dispute as to the adjustment in the Contract Price, if any, of the Construction Change Directive or timing of payment shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

17.4.2 The District may issue a Construction Change Directive in the absence of agreement on the terms of a Change Order.

17.5 Force Account Directives

17.5.1 When work, for which a definite price has not been agreed upon in advance, is to be paid for on a force account basis, all direct costs necessarily

incurred and paid by the Contractor for labor, material, and equipment used in the performance of that Work, shall be subject to the approval of the District and compensation will be determined as set forth herein.

17.5.2 The District will issue a Force Account Directive to proceed with the Work on a force account basis, and a not-to-exceed budget will be established by the District.

17.5.3 All requirements regarding direct cost for labor, labor burden, material, equipment, and markups on direct costs for overhead and profit described in this section shall apply to Force Account Directives. However, the District will only pay for actual costs verified in the field by the District or its authorized representative(s) on a daily basis.

17.5.4 The Contractor shall be responsible for all cost related to the administration of Force Account Directive. The markup for overhead and profit for Contractor modifications shall be full compensation to the Contractor to administer Force Account Directive, and Contractor shall not be entitled to separately recover additional amounts for overhead and/or profit.

17.5.5 The Contractor shall notify the District or its authorized representative(s) at least twenty-four (24) hours prior to proceeding with any of the force account work. Furthermore, the Contractor shall notify the District when it has consumed eighty percent (80%) of the budget, and shall not exceed the budget unless specifically authorized in writing by the District. The Contractor will not be compensated for force account work in the event that the Contractor fails to timely notify the District regarding the commencement of force account work, or exceeding the force account budget.

17.5.6 The Contractor shall diligently proceed with the work, and on a daily basis, submit a daily force account report on a form supplied by the District no later than 5:00 p.m. each day. The report shall contain a detailed itemization of the daily labor, material, and equipment used on the force account work only. The names of the individuals performing the force account work shall be included on the daily force account reports. The type and model of equipment shall be identified and listed. The District will review the information contained in the reports, and sign the reports no later than the next work day, and return a copy of the report to the Contractor for their records. The District will not sign, nor will the Contractor receive compensation for work the District cannot verify. The Contractor will provide a weekly force account summary indicating the status of each Force Account Directive in terms of percent complete of the not-to-exceed budget and the estimated percent complete of the work.

17.5.7 In the event the Contractor and the District reach a written agreement on a set cost for the work while the work is proceeding based on a Force Account Directive, the Contractor's signed daily force account reports shall be discontinued and all previously signed reports shall be invalid.

17.6 Price Request

17.6.1 Definition of Price Request

A Price Request ("PR") is a written request prepared by the Architect requesting the Contractor to submit to the District and the Architect an estimate of the effect of a proposed change in the Work on the Contract Price and the Contract Time.

17.6.2 Scope of Price Request

A Price Request shall contain adequate information, including any necessary Drawings and Specifications, to enable Contractor to provide the cost breakdowns required herein. The Contractor shall not be entitled to any additional compensation for preparing a response to a Price Request, whether ultimately accepted or not.

17.7 Proposed Change Order

17.7.1 Definition of Proposed Change Order

A Proposed Change Order ("PCO") is a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

17.7.2 Changes in Contract Price

A PCO shall include breakdowns and backup documentation pursuant to the revisions herein and sufficient, in the District's judgment, to validate any change in Contract Price. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional compensation for Change Order Work.

17.7.3 Changes in Time

A PCO shall also include any changes in time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Construction Schedule as defined in the Contract Documents. The Contractor shall justify the proposed change in time by submittal of a schedule analysis that accurately shows the impact of the change on the critical path of the Construction Schedule ("Time Impact Analysis"). If Contractor fails to request a time extension in a PCO, including the Time Impact Analysis, then the Contractor is thereafter precluded from requesting, and waives any right to request, additional time and/or claim a delay. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional time for Change Order Work. A PCO that leaves the amount of time requested blank, or states that such time requested is "to be determined", is not permitted and shall also constitute a waiver of any right to request additional time and/or claim a delay.

17.7.4 Unknown and/or Unforeseen Conditions

If there is an Allowance, then Contractor must submit a Request for Allowance Expenditure Directive, including supporting documentation as described below, to receive authorization for the release of funds from the Allowance. If cost of the unforeseen condition(s) exceed the Allowance, Contractor must submit a PCO requesting an increase in Contract Price and/or Contract Time that is based at least partially on Contractor's assertion that Contractor has encountered unknown and/or unforeseen condition(s) on the Project, then Contractor shall base the PCO on provable information that, beyond a reasonable doubt and to the District's satisfaction, demonstrates that the unknown and/or unforeseen condition(s) were

actually unknown and/or unforeseen and that the condition(s) were reasonably unknown and/or unforeseen. If not, the District shall deny the PCO as unsubstantiated, and the Contractor shall complete the Project without any increase in Contract Price and/or Contract Time based on that PCO.

17.7.5 Time to Submit Proposed Change Order

Contractor shall submit its PCO within five (5) working days of the date Contractor discovers, or reasonably should have discovered, the circumstances giving rise to the PCO, unless additional time to submit a PCO is granted in writing by the District. Time is of the essence in Contractor's submission of PCOs so that the District can promptly investigate the basis for the PCO. Accordingly, if Contractor fails to submit its PCO within this timeframe, Contractor waives, releases, and discharges any right to assert or claim any entitlement to an adjustment of the Contract Price and/or Time based on circumstances giving rise to the PCO.

17.7.6 Proposed Change Order Certification

In submitting a PCO, Contractor certifies and affirms that the cost and/or time request is submitted in good faith, that the cost and/or time request is accurate and in accordance with the provisions of the Contract Documents, and the Contractor submits the cost and/or request for extension of time recognizing the significant civil penalties and treble damages which follow from making a false claim or presenting a false claim under Government Code section 12650 et seq.

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17.8 Format for Proposed Change Order

17.8.1 The following format shall be used as applicable by the District and the Contractor (e.g. Change Orders, PCO's) to communicate proposed additions and deductions to the Contract, supported by attached documentation. Any spaces left blank will be deemed no change to cost or time.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add overhead and profit for any and all tiers of Subcontractor**, the total not to exceed ten percent (10%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (f)		
(h)	**Subtotal**		
(i)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (h)		
(j)	**TOTAL**		
(k)	**Time** (zero unless indicated; "TBD" not permitted)	**____ Calendar Days**	

	WORK PERFORMED BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (f)		
(h)	**TOTAL**		
(i)	**Time** (zero unless indicated; "TBD" not permitted)	**____ Calendar Days**	

17.8.2 Labor. Contractor shall be compensated for the costs of labor actually and directly utilized in the performance of the Work. Such labor costs shall be limited to field labor for which there is a prevailing wage rate classification. Wage rates for labor shall not exceed the prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Work. Labor costs shall exclude costs incurred by the Contractor in preparing estimate(s) of

the costs of the change in the Work, in the maintenance of records relating to the costs of the change in the Work, coordination and assembly of materials and information relating to the change in the Work or performance thereof, or the supervision and other overhead and general conditions costs associated with the change in the Work or performance thereof, including but not limited to the cost for the job superintendent.

17.8.3 Materials. Contractor shall be compensated for the costs of materials necessarily and actually used or consumed in connection with the performance of the change in the Work. Costs of materials may include reasonable costs of transportation from a source closest to the Site of the Work and delivery to the Site. If discounts by material suppliers are available for materials necessarily used in the performance of the change in the Work, they shall be credited to the District. If materials necessarily used in the performance of the change in the Work are obtained from a supplier or source owned in whole or in part by the Contractor, compensation therefor shall not exceed the current wholesale price for such materials. If, in the reasonable opinion of the District, the costs asserted by the Contractor for materials in connection with any change in the Work are excessive, or if the Contractor fails to provide satisfactory evidence of the actual costs of such materials from its supplier or vendor of the same, the costs of such materials and the District's obligation to pay for the same shall be limited to the then lowest wholesale price at which similar materials are available in the quantities required to perform the change in the Work. The District may elect to furnish materials for the change in the Work, in which event the Contractor shall not be compensated for the costs of furnishing such materials or any mark-up thereon.

17.8.4 Equipment. As a precondition to the District's duty to pay for Equipment rental or loading and transportation, Contractor shall provide satisfactory evidence of the actual costs of Equipment from the supplier, vendor or rental agency of same. Contractor shall be compensated for the actual cost of the necessary and direct use of Equipment in the performance of the change in the Work. Use of such Equipment in the performance of the change in the Work shall be compensated in increments of fifteen (15) minutes. Rental time for Equipment moved by its own power shall include time required to move such Equipment to the site of the Work from the nearest available rental source of the same. If Equipment is not moved to the Site by its own power, Contractor will be compensated for the loading and transportation costs in lieu of rental time. The foregoing notwithstanding, neither moving time or loading and transportation time shall be allowed if the Equipment is used for performance of any portion of the Work other than the change in the Work. Unless prior approval in writing is obtained by the Contractor from the Architect, the Project Inspector and the District, no costs or compensation shall be allowed for time while Construction Equipment is inoperative, idle or on standby, for any reason. Contractor shall not be entitled to an allowance or any other compensation for Equipment or tools used in the performance of change in the Work where such Equipment or tools have a replacement value of $500.00 or less. Equipment costs claimed by the Contractor in connection with the performance of any Work shall not exceed rental rates established by distributors or construction equipment rental agencies in the locality of the Site; any costs asserted which exceed such rental rates shall not be allowed or paid. Unless otherwise specifically approved in writing by the Architect, the Project Inspector and the District, the allowable rate for the use of Equipment in connection with the Work shall constitute full compensation to the Contractor for the cost of rental, fuel, power, oil, lubrication, supplies, necessary attachments, repairs or maintenance of any kind, depreciation, storage, insurance,

labor (exclusive of labor costs of the Equipment operator), and any and all other costs incurred by the Contractor incidental to the use of such Equipment.

17.8.5 Overhead and Profit. The phrase "Overhead and Profit" shall include field and office supervisors and assistants, watchperson, use of small tools, consumable, insurance other than construction bonds and insurance required herein, and general field and home office expenses.

17.9 Change Order Certification

17.9.1 All Change Orders and PCOs must include the following certification by the Contractor:

17.9.1.1 The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

17.9.1.2 It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

17.10 Determination of Change Order Cost

17.10.1 The amount of the increase or decrease in the Contract Price from a Change Order, if any, shall be determined in one or more of the following ways as applicable to a specific situation and at the District's discretion:

17.10.1.1 District acceptance of a PCO;

17.10.1.2 By unit prices contained in Contractor's original bid;

17.10.1.3 By agreement between District and Contractor.

17.11 Deductive Change Orders

All deductive Change Order(s) must be prepared pursuant to the provisions herein. Where a portion of the Work is deleted from the Contract, the reasonable value of the deducted work less the value of work performed shall be considered the appropriate deduction. The value submitted on the Schedule of Values shall be used to calculate the credit amount unless the bid documentation is being held in escrow as part of the Contract Documents. Unit Prices, if any, may be used in District's discretion in calculating reasonable value. If Contractor offers a proposed amount for a deductive Change Order(s), Contractor shall include a minimum of five percent (5%) total profit

and overhead to be deducted with the amount of the work of the Change Order(s). If Subcontractor work is involved, Subcontractors shall also include a minimum of five percent (5%) profit and overhead to be deducted with the amount of its deducted work. Any deviation from this provision shall not be allowed.

17.12 Addition or Deletion of Alternate Bid Item(s)

If the Bid Form and Proposal includes proposal(s) for Alternate Bid Item(s), during Contractor's performance of the Work, the District may elect to add or delete any such Alternate Bid Item(s) if not included in the Contract at the time of award. If the District elects to add or delete Alternate Bid Item(s) after Contract award, the cost or credit for such Alternate Bid Item(s) shall be as set forth in the Bid Form and Proposal unless the parties agree to a different price and the Contract Time shall be adjusted by the number of days allocated in the Contract Documents. If days are not allocated in the Contract Documents, the Contract Time shall be equitably adjusted.

17.13 Discounts, Rebates, and Refunds

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be allowed as a reduction of the Contractor's cost in determining the actual cost of construction for purposes of any change, addition, or omission in the Work as provided herein.

17.14 Accounting Records

With respect to portions of the Work performed by Change Orders and Construction Change Directives, the Contractor shall keep and maintain cost-accounting records satisfactory to the District, including, without limitation, Job Cost Reports as provided in these General Conditions, which shall be available to the District on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents. Such records shall include without limitation hourly records for Labor and Equipment and itemized records of materials and Equipment used that day in connection with the performance of any Work. All records maintained hereunder shall be subject to inspection, review and/or reproduction by the District, the Architect or the Project Inspector upon request. In the event that the Contractor fails or refuses, for any reason, to maintain or make available for inspection, review and/or reproduction such records, the District's reasonable good faith determination of the extent of adjustment to the Contract Price shall be final, conclusive, dispositive and binding upon Contractor.

17.15 Notice Required

If the Contractor desires to make a claim for an increase in the Contract Price, or any extension in the Contract Time for completion, it shall notify the District pursuant to the provisions herein, including the Article on Claims and Disputes. No claim shall be considered unless made in accordance with this subparagraph. Contractor shall proceed to execute the Work even though the adjustment may not have been agreed upon. Any change in the Contract Price or extension of the Contract Time resulting from such claim shall be authorized by a Change Order.

17.16 Applicability to Subcontractors

Any requirements under this Article shall be equally applicable to Change Orders or Construction Change Directives issued to Subcontractors by the Contractor to the extent as required by the Contract Documents.

17.17 Alteration to Change Order Language

Contractor shall not alter Change Orders or reserve time in Change Orders. Change Orders altered in violation of this provision, if in conflict with the terms set forth herein, shall be construed in accordance with the terms set forth herein. Contractor shall execute finalized Change Orders and proceed under the provisions herein with proper notice.

17.18 Failure of Contractor to Execute Change Order

Contractor shall be in default of the Contract if Contractor fails to execute a Change Order when the Contractor agrees with the addition and/or deletion of the Work in that Change Order.

18. REQUEST FOR INFORMATION

18.1 Any Request for Information shall reference all applicable Contract Document(s), including Specification section(s), detail(s), page number(s), drawing number(s), and sheet number(s), etc. The Contractor shall make suggestions and interpretations of the issue raised by each Request for Information. A Request for Information cannot modify the Contract Price, Contract Time, or the Contract Documents. Upon request by the District, Contractor shall provide an electronic copy of the Request for Information in addition to the hard copy.

18.2 The Contractor shall be responsible for any costs incurred for professional services that District may deduct from any amounts owing to the Contractor, if a Request for Information requests an interpretation or decision of a matter where the information sought is equally available to the party making the request. District, at its sole discretion, shall deduct from and/or invoice Contractor for all the professional services arising herein.

19. PAYMENTS

19.1 Contract Price

The Contract Price is stated in the Agreement and, including authorized adjustments, is the total amount payable by the District to the Contractor for performance of the Work under the Contract Documents.

19.2 Applications for Progress Payments

19.2.1 Procedure for Applications for Progress Payments

19.2.1.1 Application for Progress Payment

19.2.1.1.1 Not before the fifth (5th) day of each calendar month during the progress of the Work, Contractor shall submit to the District and the

Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, if required, and supported by the following or each portion thereof unless waived by the District in writing:

19.2.1.1.1.1 The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;

19.2.1.1.1.2 The amount being requested under the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

19.2.1.1.1.3 The balance that will be due to each of such entities after said payment is made;

19.2.1.1.1.4 A certification that the As-Built Drawings and annotated Specifications are current;

19.2.1.1.1.5 Itemized breakdown of work done for the purpose of requesting partial payment;

19.2.1.1.1.6 An updated and acceptable construction schedule in conformance with the provisions herein;

19.2.1.1.1.7 The additions to and subtractions from the Contract Price and Contract Time;

19.2.1.1.1.8 A total of the retentions held;

19.2.1.1.1.9 Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the District may require from time to time;

19.2.1.1.1.10 The percentage of completion of the Contractor's Work by line item;

19.2.1.1.1.11 Schedule of Values updated from the preceding Application for Payment;

19.2.1.1.1.12 A duly completed and executed conditional waiver and release upon progress payment compliant with Civil Code section 8132 from the Contractor and each subcontractor of any tier and supplier to be paid from the current progress payment;

19.2.1.1.1.13 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134 from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payment(s); and

19.2.1.1.1.14 A certification by the Contractor of the following:

The Contractor warrants title to all Work performed as of the date of this payment application has been completed in accordance with the Contract Documents for the Project. The Contractor further warrants that all amounts have been paid for work which previous Certificates for Payment were issued and payments received and all Work performed as of the date of this payment application is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, workers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work, except those of which the District has been informed. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.

19.2.1.1.1.15 The Contractor shall be subject to the False Claims Act set forth in Government Code section 12650 et seq. for information provided with any Application for Progress Payment.

19.2.1.1.1.16 All remaining certified payroll records ("CPR(s)") for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work for the period of the Application for Payment. As indicated herein, the District shall not make any payment to Contractor until:

19.2.1.1.1.16.1 Contractor and/or its Subcontractor(s) provide electronic CPRs weekly for all weeks any journeyman, apprentice, worker or other employee was employed in connection with the Work directly to the DIR, or within ten (10) days of any request by the District or the DIR, and

19.2.1.1.1.16.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs in a timely manner may directly delay the Contractor's payment.

19.2.1.1.2 Applications received after June 20th will not be paid until the second week of July and applications received after December 12th will not be paid until the first week of January.

19.2.2 <u>Prerequisites for Progress Payments</u>

19.2.2.1 <u>First Payment Request</u>: The following items, if applicable, must be completed before the District will accept and/or process the Contractor's first payment request:

19.2.2.1.1 Installation of the Project sign;

19.2.2.1.2 Installation of field office;

19.2.2.1.3 Installation of temporary facilities and fencing;

19.2.2.1.4 Schedule of Values;

19.2.2.1.5 Contractor's Construction Schedule;

19.2.2.1.6 Schedule of unit prices, if applicable;

19.2.2.1.7 Submittal Schedule;

19.2.2.1.8 Receipt by Architect of all submittals due as of the date of the payment application;

19.2.2.1.9 Copies of necessary permits;

19.2.2.1.10 Copies of authorizations and licenses from governing authorities;

19.2.2.1.11 Initial progress report;

19.2.2.1.12 Surveyor qualifications;

19.2.2.1.13 Written acceptance of District's survey of rough grading, if applicable;

19.2.2.1.14 List of all Subcontractors, with names, license numbers, telephone numbers, and Scope of Work;

19.2.2.1.15 All bonds and insurance endorsements; and

19.2.2.1.16 Resumes of Contractor's project manager, and if applicable, job site secretary, record documents recorder, and job site superintendent.

19.2.2.2 Second Payment Request: The District will not process the second payment request until and unless all submittals and Shop Drawings have been accepted for review by the Architect.

19.2.2.3 No Waiver of Criteria: Any payments made to Contractor where criteria set forth herein have not been met shall not constitute a waiver of said criteria by District. Instead, such payment shall be construed as a good faith effort by District to resolve differences so Contractor may pay its Subcontractors and suppliers. Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

19.3 Progress Payments

19.3.1 District's Approval of Application for Payment

19.3.1.1 Upon receipt of an Application for Payment, The District shall act in accordance with both of the following:

19.3.1.1.1 Each Application for Payment shall be reviewed by the District as soon as practicable after receipt for the purpose of determining that the Application for Payment is a proper Application for Payment.

19.3.1.1.2 Any Application for Payment determined not to be a proper Application for Payment suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days, after receipt. An Application for Payment returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the Application for Payment is not proper. The number of days available to the District to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the District exceeds this seven-day return requirement.

19.3.1.1.3 An Application for Payment shall be considered properly executed if funds are available for payment of the Application for Payment, and payment is not delayed due to an audit inquiry by the financial officer of the District.

19.3.1.2 The District's review of the Contractor's Application for Payment will be based on the District's and the Architect's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the District's and the Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to:

19.3.1.2.1 Observation of the Work for general conformance with the Contract Documents,

19.3.1.2.2 Results of subsequent tests and inspections,

19.3.1.2.3 Minor deviations from the Contract Documents correctable prior to completion, and

19.3.1.2.4 Specific qualifications expressed by the Architect.

19.3.1.3 District's approval of the certified Application for Payment shall be based on Contractor complying with all requirements for a fully complete and valid certified Application for Payment.

19.3.2 <u>Payments to Contractor</u>

19.3.2.1 Within thirty (30) days after approval of the Application for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as verified by Architect and Inspector and certified by Contractor) up to the last day of the previous month, less the aggregate of previous payments and amount to be withheld. The value of the Work completed shall be Contractor's best estimate. No inaccuracy or error in said estimate shall operate to release the Contractor, or any Surety upon any bond, from damages arising from such Work, or from the District's right to enforce each and every provision of this Contract, and the District shall have the right subsequently to correct any error made in any estimate for payment.

19.3.2.2 The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for Work performed, so long as any lawful or proper direction given by the District concerning the Work, or any portion thereof, remains incomplete.

19.3.2.3 If the District fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted Application for Payment from the Contractor, the District shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure.

19.3.3 No Waiver

No payment by District hereunder shall be interpreted so as to imply that District has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the District may enforce each and every provision of this Contract. The District may correct or require correction of any error subsequent to any payment.

19.4 Decisions to Withhold Payment

19.4.1 Reasons to Withhold Payment

The District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District's opinion, the representations to the District required herein cannot be made. The District may withhold payment, in whole, or in part, to such extent as may be necessary to protect the District from loss because of, but not limited to any of the following:

19.4.1.1 Defective Work not remedied within **FORTY-EIGHT (48)** hours of written notice to Contractor.

19.4.1.2 Stop Payment Notices or other liens served upon the District as a result of the Contract. Contractor agrees that the District may withhold up to 125% of the amount claimed in the Stop Payment Notice to answer the claim and to provide for the District's reasonable cost of any litigation pursuant to the stop payment notice.

19.4.1.3 Liquidated damages assessed against the Contractor.

19.4.1.4 The cost of completion of the Contract if there exists a reasonable doubt that the Work can be completed for the unpaid balance of the Contract Price or by the completion date.

19.4.1.5 Damage to the District or other contractor(s).

19.4.1.6 Unsatisfactory prosecution of the Work by the Contractor.

19.4.1.7 Failure to store and properly secure materials.

19.4.1.8 Failure of the Contractor to submit, on a timely basis, proper, sufficient, and acceptable documentation required by the Contract Documents, including, without limitation, a Construction Schedule, Schedule of Submittals, Schedule of Values, Monthly Progress Schedules, Shop Drawings, Product Data and samples, Proposed product lists, executed Change Orders, and/or verified reports.

19.4.1.9 Failure of the Contractor to maintain As-Built Drawings.

19.4.1.10 Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment.

19.4.1.11 Unauthorized deviations from the Contract Documents.

19.4.1.12 Failure of the Contractor to prosecute the Work in a timely manner in compliance with the Construction Schedule, established progress schedules, and/or completion dates.

19.4.1.13 Failure to provide acceptable electronic certified payroll records, as required by the Labor Code, by these Contract Documents, or by written request; for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or by each Subcontractor in connection with the Work for the period of the Application for Payment or if payroll records are delinquent or inadequate.

19.4.1.14 Failure to properly pay prevailing wages as required in Labor Code section 1720 et seq., failure to comply with any other Labor Code requirements, and/or failure to comply with labor compliance monitoring and enforcement by the DIR.

19.4.1.15 Allowing an unregistered subcontractor, as described in Labor Code section 1725.5, to engage in the performance of any work under this Contract.

19.4.1.16 Failure to comply with any applicable federal statutes and regulations regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon Act and related requirements, Contract Work Hours and Safety Standards Act requirements, if applicable.

19.4.1.17 Failure to properly maintain or clean up the Site.

19.4.1.18 Failure to timely indemnify, defend, or hold harmless the District.

19.4.1.19 Any payments due to the District, including but not limited to payments for failed tests, utilities changes, or permits.

19.4.1.20 Failure to pay Subcontractor(s) or supplier(s) as required by law and by the Contract Documents.

19.4.1.21 Failure to pay any royalty, license or similar fees.

19.4.1.22 Contractor is otherwise in breach, default, or in substantial violation of any provision of this Contract.

19.4.1.23 Failure to perform any implementation and/or monitoring required by any SWPPP for the Project and/or the imposition of any penalties or fines therefore whether imposed on the District or Contractor.

19.4.2 Reallocation of Withheld Amounts

19.4.2.1 District may, in its discretion, apply any withheld amount to pay outstanding claims or obligations as defined herein. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then that amount shall be considered a payment made under Contract by District to Contractor and District shall not be liable to Contractor for any payment made in good faith. These payments may be made without prior judicial determination of claim or obligation. District will render Contractor an accounting of funds disbursed on behalf of Contractor.

19.4.2.2 If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, District may, after **FORTY-EIGHT (48)** hours' written notice to the Contractor and, without prejudice to any other remedy, make good such deficiencies. The District shall adjust the total Contract Price by reducing the amount thereof by the cost of making good such deficiencies. If District deems it inexpedient to correct Work that is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract Price (of at least one hundred fifty percent (150%) of the estimated reasonable value of the nonconforming Work) shall be made therefor.

19.4.3 Payment After Cure

When Contractor removes the grounds for declining approval, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

19.5 Subcontractor Payments

19.5.1 Payments to Subcontractors

No later than seven (7) days after receipt, or pursuant to Business and Professions Code section 7108.5 and Public Contract Code section 7107, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Sub-subcontractors in a similar manner.

19.5.2 No Obligation of District for Subcontractor Payment

The District shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

19.5.3 Joint Checks

District shall have the right in its sole discretion, if necessary for the protection of the District, to issue joint checks made payable to the Contractor and Subcontractors and/or material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint check payment be construed to create any

contract between the District and a Subcontractor of any tier, or a material or equipment supplier, any obligation from the District to such Subcontractor or a material or equipment supplier, or rights in such Subcontractor or a material or equipment supplier against the District.

20. COMPLETION OF THE WORK

20.1 Completion

20.1.1 District will accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District.

20.1.2 The Work may only be accepted as complete by action of the governing board of the District.

20.1.3 District, at its sole option, may accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District, except for minor corrective items, as distinguished from incomplete items. If Contractor fails to complete all minor corrective items within fifteen (15) days after the date of the District's acceptance of completion, District shall withhold from the final payment one hundred fifty percent (150%) of an estimate of the amount sufficient to complete the corrective items, as determined by District, until the item(s) are completed.

20.1.4 At the end of the 15-day period, if there are any items remaining to be corrected, District may elect to proceed as provided herein related to adjustments to Contract Price, and/or District's right to perform the Work of the Contractor.

20.2 Close-Out/Certification Procedures

20.2.1 Punch List

The Contractor shall notify the Architect when Contractor considers the Work complete. Upon notification, Architect will prepare a list of minor items to be completed or corrected ("Punch List"). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct items on the Punch List. Failure to include an item on Punch List does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

20.2.2 Close-Out/Certification Requirements

20.2.2.1 Utility Connections

Buildings shall be connected to water, gas, sewer, and electric services, complete and ready for use. Service connections shall be made and existing services reconnected.

20.2.2.2 Record Drawings and Record Specifications

20.2.2.2.1 Contractor shall provide exact Record Drawings of the Work ("As-Builts") and Record Specifications upon completion of the Project and as a condition precedent to approval of final payment.

20.2.2.2.2 Contractor shall obtain the Inspector's approval of the corrected prints and employ a competent draftsman to transfer the Record Drawings information to the most current version of AutoCAD that is, at that time, currently utilized for plan check submission by either the District, the Architect, OPSC, and/or DSA, and print a complete set of transparent sepias. When completed, Contractor shall deliver corrected sepias and diskette/CD/other data storage device acceptable to District with AutoCAD file to the District.

20.2.2.2.3 Contractor is liable and responsible for any and all inaccuracies in the Record Drawings and Record Specifications, even if inaccuracies become evident at a future date.

20.2.2.3 Maintenance Manuals: Contractor shall prepare all operation and maintenance manuals and date as indicated in the Specifications.

20.2.2.4 Source Programming: Contractor shall provide all source programming for all items in the Project.

20.2.2.5 Verified Reports: Contractor shall completely and accurately fill out and file forms DSA 6-C or DSA 152 (or current form), as appropriate. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

20.3 Final Inspection

20.3.1 Contractor shall comply with Punch List procedures as provided herein, and maintain the presence of a Project Superintendent and Project Manager until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Contractor demobilize its forces prior to completion of the Punch List without District's prior written approval. Upon receipt of Contractor's written notice that all of the Punch List items have been fully completed and the Work is ready for final inspection and District acceptance, Architect and Project Inspector will inspect the Work and shall submit to Contractor and District a final inspection report noting the Work, if any, required in order to complete in accordance with the Contract Documents. Absent unusual circumstances, this report shall consist of the Punch List items not yet satisfactorily completed.

20.3.2 Upon Contractor's completion of all items on the Punch List and any other uncompleted portions of the Work, the Contractor shall notify the District and Architect, who shall again inspect such Work. If the Architect finds the Work complete and acceptable under the Contract Documents, the Architect will notify Contractor, who shall then jointly submit to the Architect and the District its final Application for Payment.

20.3.3 Final Inspection Requirements

20.3.3.1 Before calling for final inspection, Contractor shall determine that the following have been performed:

20.3.3.1.1 The Work has been completed.

20.3.3.1.2 All life safety items are completed and in working order.

20.3.3.1.3 Mechanical and electrical Work are complete and tested, fixtures are in place, connected, and ready for tryout.

20.3.3.1.4 Electrical circuits scheduled in panels and disconnect switches labeled.

20.3.3.1.5 Painting and special finishes complete.

20.3.3.1.6 Doors complete with hardware, cleaned of protective film, relieved of sticking or binding, and in working order.

20.3.3.1.7 Tops and bottoms of doors sealed.

20.3.3.1.8 Floors waxed and polished as specified.

20.3.3.1.9 Broken glass replaced and glass cleaned.

20.3.3.1.10 Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.

20.3.3.1.11 Work cleaned, free of stains, scratches, and other foreign matter, and damaged and broken material replaced.

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

20.3.3.1.13 Final cleanup, as provided herein.

20.4 Costs of Multiple Inspections

More than two (2) requests of the District to make a final inspection shall be considered an additional service of District, Architect, Construction Manager, and/or Project Inspector, and all subsequent costs will be invoiced to Contractor and if funds are available, withheld from remaining payments.

20.5 Partial Occupancy or Use Prior to Completion

20.5.1 District's Rights to Occupancy

The District may occupy or use any completed or partially completed portion of the Work at any stage, and such occupancy shall not constitute the District's Final Acceptance of any part of the Work. Neither the District's Final Acceptance, the making of Final Payment, any provision in Contract Documents, nor the use or occupancy of the Work, in whole or in part, by District shall constitute acceptance of Work not in accordance with the Contract Documents nor relieve the Contractor or the Contractor's Performance Bond Surety from liability with respect to any warranties or responsibility for faulty or defective Work or materials, equipment and workmanship incorporated therein. In the event that the District occupies or uses any completed or partially completed portion of the Work, the Contractor shall remain responsible for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents unless the Contractor requests in writing, and the District agrees, to otherwise divide those responsibilities. Any

dispute as to responsibilities shall be resolved pursuant to the Claims and Disputes provisions herein, with the added provision that during the dispute process, the District shall have the right to occupy or use any portion of the Work that it needs or desires to use.

20.5.2 Inspection Prior to Occupancy or Use

Immediately prior to partial occupancy or use, the District, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

20.5.3 No Waiver

Unless otherwise agreed upon, partial or entire occupancy or use of a portion or portions of the Work shall not constitute beneficial occupancy or District's acceptance of the Work not complying with the requirements of the Contract Documents.

21. FINAL PAYMENT AND RETENTION

21.1 Final Payment

Upon receipt and approval of a valid and final Application for Payment, the Architect will issue a final Certificate of Payment. The District shall thereupon jointly inspect the Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work is not complete. Upon District's acceptance of the Work of the Contractor as fully complete by the Governing Board of the District (that, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the District shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of final payment from the District, pay the amount due Subcontractors.

21.2 Prerequisites for Final Payment

The following conditions must be fulfilled prior to Final Payment:

21.2.1 A full release of all Stop Payment Notices served in connection with the Work shall be submitted by Contractor.

21.2.2 A duly completed and executed conditional waiver and release upon final payment compliant with Civil Code section 8136, from the Contractor and each subcontractor of any tier and supplier to be paid from the final payment.

21.2.3 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134, from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payments.

21.2.4 A duly completed and executed Document 00 65 19.26, "AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS" from the Contractor.

21.2.5 The Contractor shall have made all corrections to the Work that are required to remedy any defects therein, to obtain compliance with the Contract

Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of District required under the Contract Documents.

21.2.6 Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.

21.2.7 Contractor must have completed all requirements set forth under "Close-Out/Certification Procedures," including, without limitation, submission of an approved set of complete Record Drawings.

21.2.8 Architect shall have issued its written approval that final payment can be made.

21.2.9 The Contractor shall have delivered to the District all manuals and materials required by the Contract Documents, which must be approved by the District.

21.2.10 The Contractor shall have completed final clean-up as provided herein.

21.3 Retention

21.3.1 The retention, less any amounts disputed by the District or that the District has the right to withhold pursuant to provisions herein, shall be paid:

21.3.1.1 After approval by the Architect of the Application and Certificate of Payment,

21.3.1.2 After the satisfaction of the conditions set forth herein, and

21.3.1.3 After forty-five (45) days after the recording of the Notice of Completion by District.

21.3.2 No interest shall be paid on any retention, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any Escrow Agreement between the District and the Contractor pursuant to Public Contract Code section 22300.

21.4 Substitution of Securities

The District will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300.

22. UNCOVERING OF WORK

If a portion of the Work is covered without Inspector or Architect approval or not in compliance with the Contract Documents, it must, if required in writing by the District, the Project Inspector, or the Architect, be uncovered for the Project Inspector's or the Architect's observation and be corrected, replaced, and/or recovered at the Contractor's expense without change in the Contract Price or Contract Time.

23. NONCONFORMING WORK AND CORRECTION OF WORK

23.1 Nonconforming Work

23.1.1 Contractor shall promptly remove from Premises all Work identified by District as failing to conform to the Contract Documents whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the Contract Documents without additional expense to the District and shall bear the expense of making good all work of other contractors destroyed or damaged by any removal or replacement pursuant hereto and/or any delays to the District or other Contractors caused thereby.

23.1.2 If Contractor does not remove Work that District has identified as failing to conform to the Contract Documents within a reasonable time, not to exceed **FORTY-EIGHT (48)** hours, District may remove it and may store any material at Contractor's expense. If Contractor does not pay expense(s) of that removal within ten (10) days' time thereafter, District may, upon ten (10) days' written notice, sell any material at auction or at private sale and shall deduct all costs and expenses incurred by the District and/or District may withhold those amounts from payment(s) to Contractor.

23.2 Correction of Work

23.2.1 Correction of Rejected Work

Pursuant to the notice provisions herein, the Contractor shall immediately correct the Work rejected by the District, the Architect, or the Project Inspector as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including additional testing, inspections, and compensation for the Inspector's or the Architect's services and expenses made necessary thereby.

23.2.2 One-Year Warranty Corrections

If, within one (1) year after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties established hereunder, or by the terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the District to do so. This period of one (1) year shall be extended with respect to portions of the Work first performed after Completion by the period of time between Completion and the actual performance of the Work. This obligation hereunder shall survive District's acceptance of the Work under the Contract and termination of the Contract. The District shall give such notice promptly after discovery of the condition.

23.3 District's Right to Perform Work

23.3.1 If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this contract, the District, after **FORTY-EIGHT (48)** hours written notice to the Contractor, may, without prejudice to any other remedy it may

have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

23.3.2 If it is found at any time, before or after completion of the Work, that Contractor has varied from the Drawings and/or Specifications, including, but not limited to, variation in material, quality, form, or finish, or in the amount or value of the materials and labor used, District may require at its option:

23.3.2.1 That all such improper Work be removed, remade or replaced, and all work disturbed by these changes be made good by Contractor at no additional cost to the District;

23.3.2.2 That the District deduct from any amount due Contractor the sum of money equivalent to the difference in value between the work performed and that called for by the Drawings and Specifications; or

23.3.2.3 That the District exercise any other remedy it may have at law or under the Contract Documents, including but not limited to the District hiring its own forces or another contractor to replace the Contractor's nonconforming Work, in which case the District shall either issue a deductive Change Order, a Construction Change Directive, or invoice the Contractor for the cost of that work. Contractor shall pay any invoices within thirty (30) days of receipt of same or District may withhold those amounts from payment(s) to Contractor.

24. TERMINATION AND SUSPENSION

24.1 District's Right to Terminate Contractor for Cause

24.1.1 Grounds for Termination: The District, in its sole discretion, may terminate the Contract and/or terminate the Contractor's right to perform the work of the Contract based upon any of the following:

24.1.1.1 Contractor refuses or fails to execute the Work or any separable part thereof with sufficient diligence as will ensure its completion within the time specified or any extension thereof, or

24.1.1.2 Contractor fails to complete said Work within the time specified or any extension thereof, or

24.1.1.3 Contractor persistently fails or refused to perform Work or provide material of sufficient quality as to be in compliance with Contract Documents; or

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

24.1.1.5 Contractor fails to make prompt payment to Subcontractors, or for material, or for labor; or

24.1.1.6 Contractor persistently disregards laws, or ordinances, or instructions of District; or

24.1.1.7 Contractor fails to supply labor, including that of Subcontractors, that is sufficient to prosecute the Work or that can work in harmony with all other elements of labor employed or to be employed on the Work; or

24.1.1.8 Contractor or its Subcontractor(s) is/are otherwise in breach, default, or in substantial violation of any provision of this Contract, including but not limited to a lapse in licensing or registration.

24.1.2 Notification of Termination

24.1.2.1 Upon the occurrence at District's sole determination of any of the above conditions, District may, without prejudice to any other right or remedy, serve written notice upon Contractor and its Surety of District's termination of this Contract and/or the Contractor's right to perform the work of the Contract. This notice will contain the reasons for termination. Unless, within three (3) days after the service of the notice, any and all condition(s) shall cease, and any and all violation(s) shall cease, or arrangement satisfactory to District for the correction of the condition(s) and/or violation(s) be made, this Contract shall cease and terminate. Upon Termination, Contractor shall not be entitled to receive any further payment until the entire Work is finished.

24.1.2.2 Upon Termination, District may immediately serve written notice of tender upon Surety whereby Surety shall have the right to take over and perform this Contract only if Surety:

24.1.2.2.1 Within three (3) days after service upon it of the notice of tender, gives District written notice of Surety's intention to take over and perform this Contract; and

24.1.2.2.2 Commences performance of this Contract within three (3) days from date of serving of its notice to District.

24.1.2.3 Surety shall not utilize Contractor in completing the Project if the District notifies Surety of the District's objection to Contractor's further participation in the completion of the Project. Surety expressly agrees that any contractor which Surety proposes to fulfill Surety's obligations is subject to District's approval. District's approval shall not be unreasonably withheld, conditioned or delayed.

24.1.2.4 If Surety fails to notify District or begin performance as indicated herein, District may take over the Work and execute the Work to completion by any method it may deem advisable at the expense of Contractor and/or its Surety. Contractor and/or its Surety shall be liable to District for any excess cost or other damages the District incurs thereby. Time is of the essence in this Contract. If the District takes over the Work as herein provided, District may, without liability for so doing, take possession of and utilize in completing the Work such materials, appliances, plan, and other property belonging to Contractor as may be on the Site of the Work, in bonded storage, or previously paid for.

24.1.3 Effect of Termination

24.1.3.1 Contractor shall, only if ordered to do so by the District, immediately remove from the Site all or any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The District retains the right, but not the obligation, to keep and use any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The Contractor and its Surety shall be liable upon the performance bond for all damages caused to the District by reason of the Contractor's failure to complete the Contract.

24.1.3.2 In the event that the District shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the District shall not be liable nor account to the Contractor in any way for the time within which, or the manner in which, the Work is performed by the District or for any changes the District may make in the Work or for the money expended by the District in satisfying claims and/or suits and/or other obligations in connection with the Work.

24.1.3.3 In the event that the Contract is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor or any impact or impairment of Contractor's bonding capacity.

24.1.3.4 If the expense to the District to finish the Work exceeds the unpaid Contract Price, Contractor and Surety shall pay difference to District within twenty-one (21) days of District's request.

24.1.3.5 The District shall have the right (but shall have no obligation) to assume and/or assign to a general contractor or construction manager or other third party who is qualified and has sufficient resources to complete the Work, the rights of the Contractor under its subcontracts with any or all Subcontractors. In the event of an assumption or assignment by the District, no Subcontractor shall have any claim against the District or third party for Work performed by Subcontractor or other matters arising prior to termination of the Contract. The District or any third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after assumption or assignment. Should the District so elect, the Contractor shall execute and deliver all documents and take all steps, including the legal assignment of its contractual rights, as the District may require, for the purpose of fully vesting in the District the rights and benefits of its Subcontractor under Subcontracts or other obligations or commitments. All payments due the Contractor hereunder shall be subject to a right of offset by the District for expenses and damages suffered by the District as a result of any default, acts, or omissions of the Contractor. Contractor must include this assignment provision in all of its contracts with its Subcontractors.

24.1.3.6 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to District.

24.1.4 Emergency Termination of Public Contracts Act of 1949

24.1.4.1 This Contract is subject to termination as provided by sections 4410 and 4411 of the Government Code of the State of California, being a portion of the Emergency Termination of Public Contracts Act of 1949.

24.1.4.1.1 Section 4410 of the Government Code states:

In the event a national emergency occurs, and public work, being performed by contract, is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the public agency and the contractor may, by written agreement, terminate said contract.

24.1.4.1.2 Section 4411 of the Government Code states:

Such an agreement shall include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case.

24.1.4.2 Compensation to the Contractor shall be determined at the sole discretion of District on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the District's discretion, in the case of any fully completed separate item or portion of the Work for which there is a separate previously submitted unit price or item on the accepted schedule of values, that price shall control. The District, at its sole discretion, may adopt the Contract Price as the reasonable value of the work done or any portion thereof.

24.2 Termination of Contractor for Convenience

24.2.1 District in its sole discretion may terminate the Contract upon three (3) days' written notice to the Contractor. Under a termination for convenience, the District retains the right to all the options available to the District if there is a termination for cause. In case of a termination for convenience, the Contractor shall have no claims against the District except:

24.2.1.1 The actual cost for labor, materials, and services performed that is unpaid and adequately documented through timesheets, invoices, receipts, or otherwise, and

24.2.1.2 Five percent (5%) of the total cost of work performed as of the date of termination, or five percent (5%) of the value of the Work yet to be performed, whichever is less. This five percent (5%) amount shall be full compensation for all Contractor's and Subcontractor(s)' mobilization and/or demobilization costs and any anticipated loss profits resulting from termination of the Contractor for convenience.

24.3 Suspension of Work

24.3.1 District in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine upon three (3) days written notice to the Contractor.

24.3.1.1 An adjustment may be made for changes in the cost of performance of the Work caused by any such suspension, delay or interruption. No adjustment shall be made to the extent:

24.3.1.1.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or

24.3.1.1.2 That an equitable adjustment is made or denied under another provision of the Contract; or

24.3.1.1.3 That the suspension of Work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder.

24.3.1.2 Any adjustments in cost of performance may have a fixed or percentage fee as provided in the section on Format for Proposed Change Order herein. This amount shall be full compensation for all Contractor's and its Subcontractor(s)' changes in the cost of performance of the Contract caused by any such suspension, delay or interruption.

25. CLAIMS PROCESS

25.1 Performance during Claim Process

Contractor and its subcontractors shall continue to perform its Work under the Contract and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement by the District.

25.2 Definition of Claim

25.2.1 Pursuant to Public Contract Code section 9204, the term "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

25.2.1.1 A time extension, including without limitation, for relief of damages or penalties for delay assessed by the District under the Contract;

25.2.1.2 Payment by the District of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or to which Contractor is not otherwise entitled to; or

25.2.1.3 An amount of payment disputed by the District.

25.3 Claims Presentation

25.3.1 If Contractor intends to apply for an increase in the Contract Price or Contract Time for any reason including, without limitation, the acts of District or its agents, Contractor shall, within thirty (30) days after the event giving rise to the Claim, give notice of the Claim in writing, including an itemized statement of the details and amounts of its Claim for any increase in the Contract Price of Contract Time, including a Schedule Analysis and any and all other documentation substantiating Contractor's claimed damages. Otherwise, Contractor shall have waived and relinquished its dispute against the District and Contractor's claims for compensation or an extension of time shall be forfeited and invalidated. Likewise, failure to timely submit a claim and the requisite supporting documentation shall constitute a waiver of such claim.

25.3.2 The Claim shall identify:

25.3.2.1 The issues, events, conditions, circumstances and/or causes giving rise to the dispute, and shall show, in detail, the cause and effect of same;

25.3.2.2 The pertinent dates and/or durations and actual and/or anticipated effects on the Contract Price, Contract Schedule milestones and/or Contract Time adjustments;

25.3.2.3 The line-item costs for labor, material, and/or equipment, if applicable; or

25.3.2.4 A request by Contractor, if any, to waive the claims procedure under Public Contract Code section 9204 and proceed directly to the commencement of a civil action or binding arbitration.

25.3.3 The Claim shall include the following certification by the Contractor:

25.3.3.1 The undersigned Contractor certifies under penalty of perjury that the attached dispute is made in good faith; that the supporting data is accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the adjustment for which Contractor believes the District is liable; and that I am duly authorized to certify the dispute on behalf of the Contractor.

25.3.3.2 Furthermore, Contractor understands that the value of the attached dispute expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from the Work performed on the Project, additional time required on the Project and/or resulting from delay to the Project. Contractor may not separately recover for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

25.4 Claim Resolution pursuant to Public Contract Code section 9204

25.4.1 STEP 1:

25.4.1.1 Upon receipt of a Claim by registered or certified mail, return receipt requested, including the documents necessary to substantiate it, the District shall conduct a reasonable review of the Claim and, within a period **not to exceed 45 days**, shall provide the Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed. Upon receipt of a Claim, the District and Contractor may, **by mutual agreement, extend the time period** to provide a written statement. If the District needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the Claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of Claim sent by registered mail or certified mail, return receipt requested, the District shall have **up to three (3) days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension**, expires to provide Contractor a written statement identifying the disputed portion and the undisputed portion.

25.4.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.1.2 Upon receipt of a Claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable. In this instance, District and Contractor must comply with the sections below regarding Public Contract Code section 20104 et seq. and Government Code Claim Act Claims.

25.4.1.3 If the District fails to issue a written statement, or to otherwise meet the time requirements of this section, this shall result in the Claim being deemed rejected in its entirety. A Claim that is denied by reason of the District's failure to have responded to a Claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the Claim or the responsibility or qualifications of Contractor.

25.4.2 STEP 2:

25.4.2.1 If Contractor disputes the District's written response, or if the District fails to respond to a Claim within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the District shall schedule a meet and confer conference within 30 days for settlement of the dispute. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, the District shall provide the Contractor a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed.

25.4.2.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District issues its

written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.3 STEP 3:

25.4.3.1 Any disputed portion of the Claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with the District and Contractor sharing the associated costs equally. The District and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the Claim remaining in dispute shall be subject to applicable procedures outside this section.

25.4.3.1.1 For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

25.4.3.2 Unless otherwise agreed to by the District and Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code section 20104.4 to mediate after litigation has been commenced.

25.4.4 STEP 4:

25.4.4.1 If mediation under this section does not resolve the parties' dispute, the District may, but does not require arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program.

25.5 <u>Subcontractor Pass-Through Claims</u>

25.5.1 If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a District because privity of contract does not exist, the contractor may present to the District a Claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that Contractor present a Claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the Claim be presented to the District shall furnish reasonable documentation to support the Claim.

25.5.2 Within 45 days of receipt of this written request from a subcontractor, Contractor shall notify the subcontractor in writing as to whether the Contractor presented the Claim to the District and, if Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not having done so.

25.5.3 The Contractor shall bind all its Subcontractors to the provisions of this section and will hold the District harmless against Claims by Subcontractors.

25.6 Government Code Claim Act Claim

25.6.1 If a claim, or any portion thereof, remains in dispute upon satisfaction of all applicable Claim Resolution requirements, including those pursuant to Public Contract Code section 9204, the Contractor shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Contractor's right to bring a civil action against the District. For purposes of those provisions, the running of the time within which a claim must be presented to the District shall be tolled from the time Contractor submits its written Claim until the time the Claim is denied, including any time utilized by any applicable meet and confer process.

25.7 Claim Resolution pursuant to Public Contract Code section 20104 et seq.

25.7.1 In the event of a disagreement between the parties as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for Work performed or not performed, the parties shall attempt to resolve all claims of three hundred seventy-five thousand dollars ($375,000) or less which arise between Contractor and District by those procedures set forth in Public Contract Code section 20104, et seq., to the extent applicable.

25.7.1.1 Contractor shall file with the District any written Claim, including the documents necessary to substantiate it, upon the application for final payment.

25.7.1.2 For claims of less than fifty thousand dollars ($50,000), the District shall respond in writing within forty-five (45) days of receipt of the Claim or may request in writing within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

25.7.1.2.1 If additional information is required, it shall be requested and provided by mutual agreement of the parties.

25.7.1.2.2 District's written response to the documented Claim shall be submitted to the Contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor to produce the additional information, whichever is greater.

25.7.1.3 For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the District shall respond in writing to all written Claims within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

25.7.1.3.1 If additional information is required, it shall be requested and provided upon mutual agreement of the District and the Contractor.

25.7.1.3.2 The District's written response to the Claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor to produce the additional information or requested documentation, whichever is greater.

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

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

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

25.7.1.7 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of the Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986, (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

25.7.1.8 The District shall not fail to pay money as to any portion of a Claim which is undisputed except as otherwise provided in the Contract Documents. In any suit filed pursuant to this section, the District shall pay interest due at the legal rate on any arbitration award or judgment. Interest shall begin to accrue on the date the suit is filed in a court of law.

25.7.2 Contractor shall bind its Subcontractors to the provisions of this Section and will hold the District harmless against disputes by Subcontractors.

25.8 Claim Resolution Non-Applicability

25.8.1 The procedures for dispute and claim resolutions set forth in this Article shall not apply to the following:

25.8.1.1 Personal injury, wrongful death or property damage claims;

25.8.1.2 Latent defect or breach of warranty or guarantee to repair;

25.8.1.3 Stop payment notices;

25.8.1.4 District's rights set forth in the Article on Suspension and Termination;

25.8.1.5 Disputes arising out of labor compliance enforcement by the Department of Industrial Relations; or

25.8.1.6 District rights and obligations as a public entity set forth in applicable statutes; provided, however, that penalties imposed against a public entity by statutes, including, but not limited to, Public Contract Code sections 20104.50 and 7107, shall be subject to the Claim Resolution requirements provided in this Article.

25.9 Attorney's Fees

25.9.1 Should litigation be necessary to enforce any terms or provisions of this Agreement, then each party shall bear its own litigation and collection expenses, witness fees, court costs and attorney's fees.

26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

26.1 Labor Compliance and Enforcement

Since this Project is subject to labor compliance and enforcement by the Department of Industrial Relations ("DIR"), Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code and Title 8 of the California Code of Regulations, including, without limitation, the requirement that the Contractor and all Subcontractors shall timely furnish complete and accurate electronic certified payroll records directly to the DIR. The District may not issue payment if this requirement is not met.

26.2 Wage Rates, Travel, and Subsistence

26.2.1 Pursuant to the provisions of Article 2 (commencing at section 1770), Chapter 1, Part 7, Division 2, of the Labor Code, the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification, or type of worker needed to execute this Contract are on file at the District's principal office and copies will be made available to any interested party on request. Contractor shall obtain and post a copy of these wage rates at the job site.

26.2.2 Holiday and overtime work, when permitted by law, shall be paid for at the general prevailing rate of per diem wages for holiday and overtime work on file

with the Director of the Department of Industrial Relations, unless otherwise specified. The holidays upon which those rates shall be paid need not be specified by the District, but shall be all holidays recognized in the applicable collective bargaining agreement. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code.

26.2.3 Contractor shall pay and shall cause to be paid each worker engaged in Work on the Project the general prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any Subcontractor and such workers.

26.2.4 If during the period this bid is required to remain open, the Director of the Department of Industrial Relations determines that there has been a change in any prevailing rate of per diem wages in the locality in which the Work under the Contract is to be performed, such change shall not alter the wage rates in the Notice to Bidders or the Contract subsequently awarded.

26.2.5 Pursuant to Labor Code section 1775, Contractor shall, as a penalty to District, forfeit the statutory amount (believed by the District to be currently up to two hundred dollars ($200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates, determined by the District and/or the Director, for the work or craft in which that worker is employed for any public work done under Contract by Contractor or by any Subcontractor under it. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

26.2.6 Any worker employed to perform Work on the Project, which Work is not covered by any classification listed in the general prevailing wage rate of per diem wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by him, and such minimum wage rate shall be retroactive to time of initial employment of such person in such classification.

26.2.7 Pursuant to Labor Code section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time, subsistence pay, and apprenticeship or other training programs authorized by Labor Code section 3093, and similar purposes.

26.2.8 Contractor shall post at appropriate conspicuous points on the Site of Project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned. In addition, Contractor shall post a sign-in log for all workers and visitors to the Site, a list of all subcontractors of any tier on the Site, and the required Equal Employment Opportunity poster(s).

26.3 Hours of Work

26.3.1 As provided in article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by Contractor or by any Subcontractor on any subcontract under this Contract upon the Work or upon

any part of the Work contemplated by this Contract shall be limited and restricted by Contractor to eight (8) hours per day, and forty (40) hours during any one week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, Work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

26.3.2 Contractor shall keep and shall cause each Subcontractor to keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by Contractor in connection with the Work or any part of the Work contemplated by this Contract. The record shall be kept open at all reasonable hours to the inspection of District and to the Division of Labor Standards Enforcement of the DIR.

26.3.3 Pursuant to Labor Code section 1813, Contractor shall as a penalty to the District forfeit the statutory amount (believed by the District to be currently twenty-five dollars ($25)) for each worker employed in the execution of this Contract by Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code.

26.3.4 Any Work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to the District.

26.4 Payroll Records

26.4.1 Contractor shall upload, and shall cause each Subcontractor performing any portion of the Work under this Contract to upload, an accurate and complete certified payroll record ("CPR") electronically using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online on a weekly basis and within ten (10 days of any request by the District or Labor Commissioner at http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html or current application and URL, showing the name, address, social security number, work classification, straight-time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work.

26.4.1.1 The CPRs enumerated hereunder shall be filed directly with the DIR on a weekly basis or to the requesting party, whether the District or DIR, within ten (10) days after receipt of each written request. The CPRs from the Contractor and each Subcontractor for each week shall be provided on or before Wednesday of the week following the week covered by the CPRs. District may not make any payment to Contractor until:

26.4.1.1.1 Contractor and/or its Subcontractor(s) provide CPRs acceptable to the DIR; and

26.4.1.1.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs to the DIR in a timely manner may directly delay Contractor's payment.

26.4.2 All CPRs shall be available for inspection at all reasonable hours at the principal office of Contractor on the following basis:

26.4.2.1 A certified copy of an employee's CPR shall be made available for inspection or furnished to the employee or his/her authorized representative on request.

26.4.2.2 CPRs shall be made available for inspection or furnished upon request to a representative of District, Division of Labor Standards Enforcement, Division of Apprenticeship Standards, and/or the DIR.

26.4.2.3 CPRs shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through the District, Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested CPRs have not been provided pursuant to the provisions herein, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by Contractor, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of Contractor.

26.4.3 Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by District, Division of Apprenticeship Standards, or Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of Contractor awarded Contract or performing Contract shall not be marked or obliterated.

26.4.4 Contractor shall inform District of the location of the records enumerated hereunder, including the street address, city, and county, and shall, within five (5) working days, provide a notice of change of location and address.

26.4.5 In the event of noncompliance with the requirements of this section, Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Contractor must comply with this section. Should noncompliance still be evident after the ten (10) day period, Contractor shall, as a penalty to District, forfeit up to one hundred dollars ($100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Labor Commissioner, these penalties shall be withheld from progress payments then due.

26.4.6 [RESERVED]

26.5 [RESERVED]

26.6 Apprentices

26.6.1 Contractor acknowledges and agrees that, if this Contract involves a dollar amount greater than or a number of working days greater than that specified in Labor Code section 1777.5, then this Contract is governed by the provisions of Labor Code Section 1777.5. It shall be the responsibility of Contractor to ensure compliance with this Article and with Labor Code section 1777.5 for all apprenticeship occupations.

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

26.6.3 Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which she/he is registered.

26.6.4 Only apprentices, as defined in section 3077 of the Labor Code, who are in training under apprenticeship standards and written apprentice agreements under chapter 4 (commencing at section 3070), division 3, of the Labor Code, are eligible to be employed. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.

26.6.5 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractors employing workers in any apprenticeable craft or trade in performing any Work under this Contract shall apply to the applicable joint apprenticeship committee for a certificate approving the Contractor or Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

26.6.6 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractor may be required to make contributions to the apprenticeship program.

26.6.7 If Contractor or Subcontractor willfully fails to comply with Labor Code section 1777.5, then, upon a determination of noncompliance by the Administrator of Apprenticeship, it shall:

26.6.7.1 Be denied the right to bid on any subsequent project for one (1) year from the date of such determination;

26.6.7.2 Forfeit as a penalty to District the full amount as stated in Labor Code section 1777.7. Interpretation and enforcement of these provisions shall be in accordance with the rules and procedures of the California Apprenticeship Council and under the authority of the Chief of the Division of Apprenticeship Standards.

26.6.8 Contractor and all Subcontractors shall comply with Labor Code section 1777.6, which section forbids certain discriminatory practices in the employment of apprentices.

26.6.9 Contractor shall become fully acquainted with the law regarding apprentices prior to commencement of the Work. Special attention is directed to sections 1777.5, 1777.6, and 1777.7 of the Labor Code, and title 8, California Code of Regulations, section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, 9th floor, San Francisco, California 94102.

26.7 Non-Discrimination

26.7.1 Contractor herein agrees to comply with the provisions of the California Fair Employment and Housing Act as set forth in part 2.8 of division 3 of the

California Government Code, commencing at section 12900; the Federal Civil Rights Act of 1964, as set forth in Public Law 88-352, and all amendments thereto; Executive Order 11246; and all administrative rules and regulations found to be applicable to Contractor and Subcontractor.

26.7.2 Special requirements for Federally Assisted Construction Contracts: During the performance of this Contract, Contractor agrees to incorporate in all subcontracts the provisions set forth in Chapter 60-1.4(b) of Title 41 published in Volume 33 No. 104 of the Federal Register dated May 28, 1968.

26.8 Labor First Aid

Contractor shall maintain emergency first aid treatment for Contractor's workers on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 et seq.) and the California Occupational Safety and Health Act of 1973 (Lab. Code, § 6300 et seq.; 8 Cal. Code of Regs., § 330 et seq.).

27. [RESERVED]

28. MISCELLANEOUS

28.1 Assignment of Antitrust Actions

28.1.1 Section 7103.5(b) of the Public Contract Code states:

In entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commending with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, which assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

28.1.2 Section 4552 of the Government Code states:

In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

28.1.3 Section 4553 of the Government Code states:

If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor

but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

28.1.4 Section 4554 of the Government Code states:

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action.

28.1.5 Under this Article, "public purchasing body" is District and "bidder" is Contractor.

28.2 Excise Taxes

If, under Federal Excise Tax Law, any transaction hereunder constitutes a sale on which a Federal Excise Tax is imposed and the sale is exempt from such Federal Excise Tax because it is a sale to a State or Local Government for its exclusive use, District, upon request, will execute documents necessary to show (1) that District is a political subdivision of the State for the purposes of such exemption, and (2) that the sale is for the exclusive use of District. No Federal Excise Tax for such materials shall be included in any Contract Price.

28.3 Taxes

Contract Price is to include any and all applicable sales taxes or other taxes that may be due in accordance with section 7051 et seq. of the Revenue and Taxation Code, Regulation 1521 of the State Board of Equalization or any other tax code that may be applicable.

28.4 Shipments

All shipments must be F.O.B. destination to Site or sites, as indicated in the Contract Documents. There must be no charge for containers, packing, unpacking, drayage, or insurance. The total Contract Price shall be all inclusive (including sales tax) and no additional costs of any type will be considered.

28.5 Compliance with Government Reporting Requirements

If this Contract is subject to federal or other governmental reporting requirements because of federal or other governmental financing in whole or in part for the Project of which it is part, or for any other reason, Contactor shall comply with those reporting requirements at the request of the District at no additional cost.

END OF DOCUMENT

DOCUMENT 00 73 13

SPECIAL CONDITIONS

THIS DOCUMENT MUST BE ADAPTED FOR EACH PROJECT – Delete any provision that is not applicable or if no change from the provision in the General Conditions.

*** THIS LIST OF SPECIAL CONDITION PROVISIONS IS FOR REFERENCE ONLY. REMOVE THIS PAGE BEFORE USING THIS DOCUMENT. ***

1. Mitigation Measures
2. Modernization Projects
3. Badge Policy for Contractors
4. Substitution for Specified Items
5. Weather Days
6. Owner-Controlled or Wrap-Up Insurance Program
7. Insurance Policy Limits
8. Permits, Certificates, Licenses, Fees, Approval
9. Project Labor Agreement/Payroll Records
10. As-Builts and Record Drawings
11. Fingerprinting
12. Disabled Veteran Business Enterprises
13. Construction Manager
14. Program Manager
15. Federal Funds
16. Preliminary Schedule of Values

DOCUMENT 00 73 13

SPECIAL CONDITIONS

1. Mitigation Measures

Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act. (Public Resources Code section 21000 *et seq*.)[A1]

2. Modernization Projects

2.1 Access. Access to the school buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with District and onsite District personnel before Work is to start. Unless agreed to otherwise in writing, only a school custodian will be allowed to unlock and lock doors in existing building(s). The custodian will be available only while school is in session. If a custodian is required to arrive before 7:00 a.m. or leave after 3:30 p.m. to accommodate Contractor's Work, the overtime wages for the custodian will be paid by the Contractor, unless at the discretion of the District, other arrangements are made in advance.

2.2 Keys. Upon request, the District may, at its own discretion, provide keys to the school site for the convenience of the Contractor. The Contractor agrees to pay all expenses to re-key the entire school site and all other affected District buildings if the keys are lost or stolen, or if any unauthorized party obtains a copy of the key or access to the school.

2.3 Maintaining Services. The Contractor is advised that Work is to be performed in spaces regularly scheduled for instruction. Interruption and/or periods of shutdown of public access, electrical service, water service, lighting, or other utilities shall be only as arranged in advance with the District. Contractor shall provide temporary services to all facilities interrupted by Contractor's Work.

2.4 Maintaining Utilities. The Contractor shall maintain in operation during duration of Contract, drainage lines, storm drains, sewers, water, gas, electrical, steam, and other utility service lines within working area.

2.5 Confidentiality. Contractor shall maintain the confidentiality of all information, documents, programs, procedures and all other items that Contractor encounters while performing the Work. This requirement shall be ongoing and shall survive the expiration or termination of this Contract and specifically includes, without limitation, all student, parent, and employee disciplinary information and health information.

2.6 Work during Instructional Time. By submitting its bid, Contractor affirms that Work may be performed during ongoing instruction in existing facilities. If so, Contractor agrees to cooperate to the best of its ability to minimize any disruption to

school operations and any use of school facilities by the public up to, and including, rescheduling specific work activities, at no additional cost to District.

2.7 **No Work during Student Testing**. Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests.

3. Badge Policy for Contractors

All Contractors doing work for the District will provide their workers with identification badges. These badges will be worn by all members of the Contractor's staff who are working in a District facility.

3.1 Badges must be filled out in full and contain the following information:

3.1.1 Name of Contractor

3.1.2 Name of Employee

3.1.3 Contractor's address and phone number

3.2 Badges are to be worn when the Contractor or his/her employees are on site and must be visible at all times. Contractors must inform their employees that they are required to allow District employees, the Architect, the Construction Manager, the Program Manager, or the Project Inspector to review the information on the badges upon request.

3.3 Continued failure to display identification badges as required by this policy may result in the individual being removed from the Project or assessment of fines against the Contractor.

4. Substitution for Specified Items

4.1 Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Contractor may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified.

4.1.1 If the material, process, or article offered by Contractor is not, in the opinion of the District, substantially equal or better in every respect to that specified, then Contractor shall furnish the material, process, or article specified in the Specifications without any additional compensation or change order.

4.1.2 This provision shall not be applicable with respect to any material, product, thing or service for which District made findings and gave notice in accordance with Public Contract Code section 3400(c); therefore, Contractor shall not be entitled to request a substitution with respect to those materials, products or services.

4.2 A request for a substitution shall be submitted as follows:

4.2.1 Contractor shall notify the District in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

4.2.2 Requests for Substitutions after award of the Contract shall be submitted within thirty-five (35) days of the date of the Notice of Award.[A2]

4.3 Within 35 days after the date of the Notice of Award, Contractor shall provide data substantiating a request for substitution of "an equal" item, including but not limited to the following:

4.3.1 All variations of the proposed substitute from the material specified including, but not limited to, principles of operation, materials, or construction finish, thickness or gauge of materials, dimensions, weight, and tolerances;

4.3.2 Available maintenance, repair or replacement services;

4.3.3 Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

4.3.4 Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the District or others under Contract with the District); and

4.3.5 The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.

4.4 No substitutions shall be made until approved, in writing, by the District. The burden of proof as to equality of any material, process, or article shall rest with Contractor. The Contractor warrants that if substitutes are approved:

4.4.1 The proposed substitute is equal or superior in all respects to that specified, and that such proposed substitute is suitable and fit for the intended purpose and will perform adequately the function and achieve the results called for by the general design and the Contract Documents;

4.4.2 The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

4.4.3 The Contractor shall be fully responsible for the installation of the substitute and any changes in the Work required, either directly or indirectly, because of the acceptance of such substitute, with no increase in Contract Price or Contract Time. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time;

4.4.4 The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute; and

4.4.5 The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net

difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit.

4.5 In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

4.6 In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

4.7 Contractor shall be responsible for any costs the District incurs for professional services, DSA fees, or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods. District may deduct those costs from any amounts owing to the Contractor for the review of the request for substitution, even if the request for substitution is not approved. District, at its sole discretion, shall deduct from the payments due to and/or invoice Contractor for all the professional services and/or DSA fees or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods arising herein.

5. **Weather Days**[A3]

Delays due to Adverse Weather conditions will only be permitted in compliance with the provisions in the General Conditions and only if the number of days of Adverse Weather exceeds the following parameters and Contractor can verify that the excess days of Adverse Weather caused delays:

January		July	
February		August	
March		September	
April		October	
May		November	
June		December	

6. Owner-Controlled or Wrap-Up Insurance Program[A4]

Contractor and all Subcontractors under the Contractor shall participate in and comply with the owner-controlled or wrap-up insurance program ("OCIP"). In addition, Contractor shall procure and maintain, at its own expense, until completion and final acceptance of the Work at least the following insurance from insurance companies with an A.M. Best rating of no less than _____, except for those coverages provided by the OCIP as described in the OCIP Manual:

[Commercial General Liability]	Personal Injury Liability, Broad Form Property Damage including completed operations, and Explosion, Collapse and Underground Hazards	**[E.G. $5,000,000]**
[Automobile Liability – Any Auto]	Bodily Injury and Property Damage	**[E.G. $5,000,000]**
[Workers Compensation]		Statutory limits pursuant to State law
[Employers' Liability]		**[E.G. $1,000,000]**

7. Insurance Policy Limits[A5]

All of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than _____. The limits of insurance shall not be less than:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	**[E.G.** Low Risk: $1,000,000 per occurrence; $2,000,000 aggregate
		Intermediate Risk: $2,000,000 per occurrence; $4,000,000 aggregate
		High Risk: $5,000,000 per occurrence; $10,000,000 aggregate**]**
Automobile Liability – Any Auto	Combined Single Limit	**[E.G.** Personal vehicles: $500,000 Commercial vehicles: $1,000,000
		Personal vehicles: $100,000 per person/ $300,000 per accident**]**
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		**[E.G. $0]**
Builder's Risk (Course of Construction)		Issued for the value and scope of Work indicated herein.
Pollution Liability		**[E.G. $0]**

8. Permits, Certificates, Licenses, Fees, Approvals

8.1 Payment for Permits, Certificates, Licenses, Fees, and Approvals. As required in the General Conditions, the Contractor shall secure and pay for all permits, licenses, approvals, and certificates necessary for the prosecution of the Work with the exception of the following:

8.1.1 _____[A6]

With respect to the above-listed items, Contractor shall be responsible for securing such items; however, District will be responsible for payment of these charges or fees. Contractor shall notify the District of the amount due with respect to such

items and to whom the amount is payable. Contractor shall provide the District with an invoice and receipt with respect to such charges or fees.

8.2 General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities

8.2.1 Contractor acknowledges that all California school districts are obligated to develop and implement the following requirements for the discharge of storm water to surface waters from its construction and land disturbance activities (storm water requirements), without limitation:

8.2.1.1 Municipal Separate Storm Sewer System (MS4) is a system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

8.2.1.2 Storm Water Pollution Prevention Plan ("SWPPP") contains specific best management practices ("BMPs") and establishes numeric effluent limitations at:

8.2.1.2.1 Sites where the District engages in maintenance (e.g., fueling, cleaning, repairing) for transportation activities.

8.2.1.2.2 Construction sites where:

8.2.1.2.2.1 One (1) or more acres of soil will be disturbed, or

8.2.1.2.2.2 The project is part of a larger common plan of development that disturbs more than one (1) acre of soil.

8.2.2 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

8.2.3 At no additional cost to the District, Contractor shall provide a Qualified Storm Water Practitioner who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

8.2.3.1 At least forty eight (48) hours prior to a forecasted rain event, implementing the Rain Event Action Plan (REAP) for any rain event requiring implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site; and

8.2.3.2 Monitoring any Numeric Action Levels (NALs), if applicable.

9. Project Labor Agreement/Payroll Records

The District has entered into a Project Labor Agreement ("PLA"), which covers this Project. Accordingly, the following provision is added as Section 26.4.6:

26.4.6 As Contractor and its subcontractors have agreed to be bound by the terms of the PLA entered into by the District [on or about / dated] _____, Contractor and its subcontractors may be excused from uploading CPRs electronically

using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online at http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html , or by using a more current application and URL. However, within ten (10) days of any request by the District or Labor Commissioner, Contractor and its subcontractors shall provide CPRs showing the name, address, social security number, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each subcontractor in connection with the Work.

10. As-Builts and Record Drawings

10.1 When called for by Division 1, Contractor shall submit As-Built Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD")[A7] files in the following format _____[A8], plus one set of As-Built Drawings on vellum or mylar[A9].

10.2 Contractor shall submit Record Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD")[A10] files in the following format _____[A11], plus one set of Record Drawings on vellum or mylar[A12]].

11. Fingerprinting

Contractor shall comply with the provisions of Education Code section 45125.2 regarding the submission of employee fingerprints to the California Department of Justice and the completion of criminal background investigations of its employees, its subcontractor(s), and its subcontractors' employees. Contractor shall not permit any employee to have any contact with District pupils until such time as Contractor has verified in writing to the governing board of the District, that such employee has not been convicted of a violent or serious felony, as defined in Education Code section 45122.1. Contractor shall fully complete and perform all tasks required pursuant to the Criminal Background Investigation/ Fingerprinting Certification.

12. Disabled Veteran Business Enterprises [A13]

This Project uses or may plan to use funds allocated pursuant to the State of California School Facility Program ("Program") for the construction and/or modernization of school buildings. Therefore, Section 17076.11 of the Education Code requires the District to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%), per year, of the overall dollar amount expended each year by the District on projects that receive state funding. ~~and t~~The Contractor must submit the Disabled Veteran Business Enterprise Participation Certification to the District with its executed Agreement, identifying the steps Contractor took to solicit DVBE participation in conjunction with this Contract.

13. Construction Manager

The District will use a Construction Manager on the Project that is the subject of this Contract. _____[A14] is the Construction Manager for this Project.

14. Program Manager

_____[A15] is the Program Manager designated for the Project that is the subject of this Contract.

15. Federal Funds

As this Project is funded in whole or in part by federal funds, Contractor and all Subcontractors are subject to civil or criminal prosecution for any violation of the federal False Claims Act set forth under section 1001 of title 18 and section 231 of title 31 of the United States Code.

The following provisions are added as Section 27 of the General Conditions:

27. FEDERAL LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

27.1 Minimum Wages

The Davis-Bacon Act and 29 CFR parts 1 through 7 shall apply if the Project is financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution.

27.1.1 All laborers and mechanics employed or working upon the Site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3) , the full amount of wages and bona fide fringe benefits, or cash equivalents thereof, due at time of payment computed at rates not less than those contained in the applicable wage determination of the Secretary of Labor regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of this section, including but not limited to paragraph 27.1.7; also, regular contributions made or costs incurred for more than a weekly period, but not less often than quarterly, under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of Work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing Work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which Work is performed. The wage determination including any additional classification and wage rates conformed under this section, including but not limited to paragraph 27.1.6 and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its Subcontractors at the Site of the Work in a prominent and accessible place where it can be easily seen by the workers.

27.1.2 Any class of laborers or mechanics, including helpers, and which is to be employed under the Contract which is not listed in the wage determination shall be classified in conformance with the wage determination. An additional classification and wage rate and fringe benefits will not be approved unless when the following criteria have been met:

27.1.2.1 The Work to be performed by the classification requested is not performed by a classification in the wage determination; and

27.1.2.2 The classification is utilized in the area by the construction industry; and

27.1.2.3 The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

27.1.3 If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the District agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contractor to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210.

27.1.4 In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the District do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contractor shall provide the questions, including the views of all interested parties and the recommendation of the District, to the District for the District's review and referral to the Administrator for determination.

27.1.5 The wage rate (including fringe benefits where appropriate) determined pursuant to this section, shall be paid to all workers performing Work in the classification under this Contract from the first day on which Work is performed in the classification.

27.1.6 Whenever the minimum wage rate prescribed in any applicable wage determination for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

27.1.7 If the Contractor does not make payments to a trustee or other third person, the Contractor may consider, as part of the wages of any laborer or mechanic, the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. If the Secretary of Labor so requires, the Contractor shall set aside in a separate account sufficient assets to meet obligations under the plan or program.

27.2 Withholding. District may, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to Davis-Bacon

prevailing wage requirements, which is held by the same Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any Subcontractor the full amount of wages required by the Contract. In the event of Contractor's or any Subcontractors' failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the Site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the District may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as it deems necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

27.3 Payrolls and basic records.

27.3.1 Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the Work and preserved for a period of three years thereafter for all laborers and mechanics working at the Site of the Work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

27.3.2 The Contractor shall submit weekly for each week in which any Contract Work is performed a copy of all payrolls to the District. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information shall be submitted on a form acceptable to the District. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at https://www.dol.gov/whd/programs/dbra/wh347.htm or its successor site. Contractor is responsible for the submission of copies of payrolls by all Subcontractors. Contractor and Subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the District, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. Contractor may require a Subcontractor to provide

addresses and social security numbers to the Contractor for its own records, without weekly submission to the District or other government agency

27.3.3 Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or Subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

27.3.3.1 That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5,

27.3.3.2 That the appropriate information is being maintained under 29 CFR 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and

27.3.3.3 That such information is correct and complete;

27.3.3.4 That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and

27.3.3.5 That no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

27.3.3.6 That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of Work performed, as specified in the applicable wage determination incorporated into or applicable to the Contract.

27.3.3.7 The weekly submission of a properly executed certification in the form set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 27.3.3 of this section.

27.3.3.8 The falsification of any of the above certifications may subject the Contractor or one or more Subcontractors to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

27.3.3.9 The Contractor or Subcontractor shall make the records required under this section available for inspection, copying, or transcription by authorized representatives of the District or the federal Department of Labor, and shall permit representatives to interview employees during working hours on the job. If the Contractor or Subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

27.4 Apprentices and trainees

27.4.1 Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the Work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first ninety (90) days of probationary employment as an apprentice in an eligible apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job Site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any apprentice performing Work on the job Site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the Work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or Subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

27.4.2 Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to Work at less than the predetermined rate for the Work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job Site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the

corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any trainee performing Work on the job Site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the Work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

27.4.3 Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

27.5 Compliance with Copeland Act requirements. Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this Contract.

27.6 Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal agency may by appropriate instructions require, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for the compliance by any Subcontractor or lower tier Subcontractor with all the Contract clauses in 29 CFR 5.5.

27.7 Contract termination: debarment. A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a Contractor and a Subcontractor as provided in 29 CFR 5.12.

27.8 Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this Contract.

27.9 Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its Subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

27.10 Certification of eligibility.

27.10.1 By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

27.10.2 No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

27.10.3 Contractor shall be subject to the penalty for making false statements prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

27.11 Clauses Mandated by Contract Work Hours and Safety Standards Act.

As used in the following paragraphs, the terms laborers and mechanics include watchmen and guards.

27.11.1 Overtime requirements. No Contractor or Subcontractor contracting for any part of the Contract Work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such Work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

27.11.2 Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in the foregoing paragraph the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the foregoing paragraph, in the sum of $10 for each calendar day on which such individual was required or permitted to Work in excess of the standard workweek of forty hours without payment of the overtime wages required by the foregoing paragraph.

27.11.3 Withholding for unpaid wages and liquidated damages. The District may upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of Work performed by the Contractor or Subcontractor under the Contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the forgoing paragraph.

27.11.4 Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the foregoing paragraphs concerning "Overtime requirements" and "Violation; liability for unpaid wages; liquidated damages" and also a clause requiring each Subcontractor to include these clauses in any lower tier subcontracts. Contractor shall be responsible for compliance by any Subcontractor or lower tier Subcontractor with the clauses set forth in paragraphs 27.11.1 through 27.11.4 of this section.

16. Preliminary Schedule of Values

The preliminary schedule of values shall include, at a minimum, the following information and the following structure:

Replace provision in the General Conditions with the following provisions:

16.1.1.2.3. The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

16.1.2.3.1 Mobilization and layout combined to equal not more than **[1]**%;

16.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than **[3]**%;

16.1.1.2.3.3 Bonds and insurance combined to equal not more than **[2]**%[A16].

END OF DOCUMENT

DOCUMENT 00 73 56

HAZARDOUS MATERIALS
PROCEDURES & REQUIREMENTS

1. Summary

This document includes information applicable to hazardous materials and hazardous waste abatement.

2. Notice of Hazardous Waste or Materials

a. Contractor shall give notice in writing to the District, the Construction Manager, and the Architect promptly, before any of the following materials are disturbed, and in no event later than twenty-four (24) hours after first observance, of any:

(1) Material that Contractor believes may be a material that is hazardous waste or hazardous material, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;

(2) Other material that may present a substantial danger to persons or property exposed thereto in connection with Work at the site.

b. Contractor's written notice shall indicate whether the hazardous waste or material was shown or indicated in the Contract Documents to be within the scope of Work, and whether the materials were brought to the site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible. As used in this section the term "hazardous materials" shall include, without limitation, asbestos, lead, Polychlorinated biphenyl (PCB), petroleum and related hydrocarbons, and radioactive material.

c. In response to Contractor's written notice, the District shall investigate the identified conditions.

d. If the District determines that conditions do not involve hazardous materials or that no change in terms of Contract is justified, the District shall so notify Contractor in writing, stating reasons. If the District and Contractor cannot agree on whether conditions justify an adjustment in Contract Price or Contract Time, or on the extent of any adjustment, Contractor shall proceed with the Work as directed by the District.

e. If after receipt of notice from the District, Contractor does not agree to resume Work based on a reasonable belief it is unsafe, or does not agree to resume Work under special conditions, then District may order such portion of Work that is in connection with such hazardous condition or such affected area to be deleted from the Work, or performed by others, or District may invoke its rights to terminate the Contract in whole or in part. District will determine entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Time as a result of deleting such portion of Work, or performing the Work by others.

f. If Contractor stops Work in connection with any hazardous condition and in any area affected thereby, Contractor shall immediately redeploy its workers, equipment, and materials, as necessary, to other portions of the Work to minimize delay and disruption.

3. Additional Warranties and Representations

a. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have the required levels of familiarity with the Site and the Work, training, and ability to comply fully with all applicable laws and contractual requirements for safe and expeditious performance of the Work, including whatever training is or may be required regarding the activities to be performed (including, but not limited to, all training required to address adequately the actual or potential dangers of Contract performance).

b. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have and maintain in good standing any and all certifications and licenses required by applicable federal, state, and other governmental and quasi-governmental requirements applicable to the Work.

c. Contractor represents and warrants that it has studied carefully all requirements of the Specifications regarding procedures for demolition, hazardous waste abatement, or safety practices, specified in the Contract, and prior to submitting its bid, has either (a) verified to its satisfaction that the specified procedures are adequate and sufficient to achieve the results intended by the Contract Documents, or (b) by way of approved "or equal" request or request for clarification and written Addenda, secured changes to the specified procedures sufficient to achieve the results intended by the Contract Documents. Contractor accepts the risk that any specified procedure will result in a completed Project in full compliance with the Contract Documents.

4. Monitoring and Testing

a. District reserves the right, in its sole discretion, to conduct air monitoring, earth monitoring, Work monitoring, and any other tests (in addition to testing required under the agreement or applicable law), to monitor Contract requirements of safe and statutorily compliant work methods and (where applicable) safe re-entry level air standards under state and federal law upon completion of the job, and compliance of the work with periodic and final inspection by public and quasi-public entities having jurisdiction.

b. Contractor acknowledges that District has the right to perform, or cause to be performed, various activities and tests including, but not limited to, pre-abatement, during abatement, and post-abatement air monitoring, that District shall have no obligation to perform said activities and tests, and that a portion of said activities and tests may take place prior to the completion of the Work by Contractor. In the event District elects to perform these activities and tests, Contractor shall afford District ample access to the Site and all areas of the Work as may be necessary for the performance of these activities and tests. Contractor will include the potential impact of these

activities or tests by District in the Contract Price and the Scheduled Completion Date.

c. Notwithstanding District's rights granted by this paragraph, Contractor may retain its own industrial hygiene consultant at Contractor's own expense and may collect samples and may perform tests including, but not limited to, pre-abatement, during abatement, and post-abatement personal air monitoring, and District reserves the right to request documentation of all such activities and tests performed by Contractor relating to the Work and Contractor shall immediately provide that documentation upon request.

5. Compliance with Laws

a. Contractor shall perform safe, expeditious, and orderly work in accordance with the best practices and the highest standards in the hazardous waste abatement, removal, and disposal industry, the applicable law, and the Contract Documents, including, but not limited to, all responsibilities relating to the preparation and return of waste shipment records, all requirements of the law, delivering of all requisite notices, and obtaining all necessary governmental and quasi-governmental approvals.

b. Contractor represents that it is familiar with and shall comply with all laws applicable to the Work or completed Work including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work relating to:

(1) The protection of the public health, welfare and environment;

(2) Storage, handling, or use of asbestos, PCB, lead, petroleum based products, radioactive material, or other hazardous materials;

(3) The generation, processing, treatment, storage, transport, disposal, destruction, or other management of asbestos, PCB, lead, petroleum, radioactive material, or hazardous waste materials or other waste materials of any kind; and

(4) The protection of environmentally sensitive areas such as wetlands and coastal areas.

6. Disposal

a. Contractor has the sole responsibility for determining current waste storage, handling, transportation, and disposal regulations for the job Site and for each waste disposal facility. Contractor must comply fully at its sole cost and expense with these regulations and any applicable law. District may, but is not obligated to, require submittals with this information for it to review consistent with the Contract Documents.

b. Contractor shall develop and implement a system acceptable to District to track hazardous waste from the Site to disposal, including appropriate "Hazardous Waste Manifests" on the EPA form, so that District may track the volume of waste it put in each landfill and receive from each landfill a certificate of receipt.

c. Contractor shall provide District with the name and address of each waste disposal facility prior to any disposal, and District shall have the express right to reject any proposed disposal facility. Contractor shall not use any disposal facility to which District has objected. Contractor shall document actual disposal or destruction of waste at a designated facility by completing a disposal certificate or certificate of destruction forwarding the original to the District.

7. Permits

a. Before performing any of the Work, and at such other times as may be required by applicable law, Contractor shall deliver all requisite notices and obtain the approval of all governmental and quasi-governmental authorities having jurisdiction over the Work. Contractor shall submit evidence satisfactory to District that it and any disposal facility:

(1) have obtained all required permits, approvals, and the like in a timely manner both prior to commencement of the Work and thereafter as and when required by applicable law; and

(2) are in compliance with all such permits, approvals and the regulations.

For example, before commencing any work in connection with the Work involving asbestos-containing materials, or PCBs, or other hazardous materials subject to regulation, Contractor agrees to provide the required notice of intent to renovate or demolish to the appropriate state or federal agency having jurisdiction, by certified mail, return receipt requested, or by some other method of transmittal for which a return receipt is obtained, and to send a copy of that notice to District. Contractor shall not conduct any Work involving asbestos-containing materials or PCBs unless Contractor has first confirmed that the appropriate agency having jurisdiction is in receipt of the required notification. All permits, licenses, and bonds that are required by governmental or quasi-governmental authorities, and all fees, deposits, tap fees, offsite easements, and asbestos and PCB disposal facilities expenses necessary for the prosecution of the Work, shall be procured and paid for by Contractor. Contractor shall give all notices and comply with the all applicable laws bearing on the conduct of the Work as drawn and specified. If Contractor observes or reasonably should have observed that Plans and Specifications and other Contract Documents are at variance therewith, it shall be responsible for promptly notifying District in writing of such fact. If Contractor performs any Work contrary to applicable laws, it shall bear all costs arising therefrom.

b. In the case of any permits or notices held in District's name or of necessity to be made in District's name, District shall cooperate with Contractor in securing the permit or giving the notice, but the Contractor shall prepare for District review and execution upon approval, all necessary applications, notices, and other materials.

8. Indemnification

To the fullest extent permitted by law, the indemnities and limitations of liability expressed throughout the Contract Documents apply with equal force and effect to any claims or liabilities imposed or existing by virtue of the removal, abatement, and disposal of hazardous waste. This includes, but is not limited to, liabilities connected to the selection and use of a waste disposal facility, a waste transporter, personal injury, property damage, loss of use of property, damage to the environment or natural resources, or "disposal" and "release" of materials associated with the Work (as defined in 42 U.S.C. § 960l *et seq*.).

9. Termination

District shall have an absolute right to terminate for default immediately without notice and without an opportunity to cure should Contractor knowingly or recklessly commit a material breach of the terms of the Contract Documents, or any applicable law, on any matter involving the exposure of persons or property to hazardous waste. However, if the breach of contract exposing persons or property to hazardous waste is due solely to an ordinary, unintentional, and non-reckless failure to exercise reasonable care, then the procedures for termination for cause shall apply without modification.

END OF DOCUMENT

DOCUMENT 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access Conditions and Requirements.

B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this Contract consists of the following:

Selective demolition and construction necessary for the limited scope modernization at Lodi Middle School, Lodi, CA as indicated in the Drawings and Specifications. Generally, these categories of work involve the following scope:

1) Removal and replacement of walkways around classrooms.

2) Modernization of toilet rooms at building F.

3) Undercutting of existing doors & installation of new door bottoms & thresholds at new walkways.

4) Sealing of brick veneer finish at all building exteriors.

5) Other work as indicated in the Construction Documents.

1.03 CONTRACTS

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

1.04 WORK BY OTHERS

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

(1) (NONE)

B. Work on the Project that will be performed by others concurrent with the Work of this Contract:

(1) (NONE)

1.05 WORK SEQUENCE

A. Schedule and construct work in stages to accommodate Owner's use of the premises before and after the primary construction period. Coordinate the construction schedule and operations with the Owner's representative.

The three stages of the construction process following the bid award shall be:

1. Pre-construction: Pre-construction activities shall occur from the start date, to the first day of site availability.

   Activities shall include, but are not limited to:

   - Identification of long lead materials and equipment
   - Shop drawing submittals
   - Deferred approval submittals
   - Field measuring
   - Color and sample submittals
   - Material ordering (particularly long lead items)
   - Material stock piling
   - Project scheduling/subcontractor coordination

   Activities to be performed by the District shall include:

   - Removal of equipment and personal items from the site that may obstruct the Contractor's work. This work by the District may not fully occur by the first day.

   The architect and engineers will expedite all long lead item submittals as quickly as possible. Such items must be indicated as "critical" when submitted. Substitutions of materials and equipment will not be permitted due to the lack of availability unless submittals are made early and completely.

2. Construction: Primary construction activities shall occur from the date of site availability, through the Date of Substantial Completion. Activities shall include work as described by the construction documents.

   It is the intention of the District to make the site available on the dates indicated below.

   Due to the nature of the work and the type of facilities, the schedule is fixed and cannot be altered. The premises will not be available prior to date of site availability. All primary work **must** be completed prior to Date of Substantial Completion. Critical work, includes life safety, on-site vehicle and student circulation facilities, campus security and general construction. Temporary measures will be required if primary work is incomplete at start of school date.

   As the District needs time for preparing for the new school session, the Contractor shall turn over facilities in an orderly sequence to allow site usage. This schedule must be prepared with the District's review, input and approval.

3. Completion/Close-out: Completion and close-out activities shall occur from Date of Substantial Completion to Final Completion.

   Activities shall include:

   - Completion of minor finish work. Minor work shall be defined as those items which will not interfere or hinder the District from utilizing the facility in a safe manner.
   - Punch list work.
   - Project close-out.

   All work performed during this period must occur outside of normal school hours. Arrangements must be made with the District representative and work schedules approved.

B. Delays:

1. Minor delays: Minor delays caused by parties other than the Contractor, such as the Owner or Architect, **will not** be considered critical path delays and **will not** result in a time extension to the project schedule. Minor delays shall be defined as delays due to the need for review, clarifications, consideration, detailing, etc. which typically do not last more than 48 hours, are addressed promptly and solved without significant changes to the work, as determined solely by the Architect. Such items which may cause delay must be identified by the Contractor at the time of origin.

2. Other delays: Other delays caused by unknown or unforeseen conditions or significant changes or modifications requested by or required by the Owner, Architect or DSA, will be permitted only if promptly submitted, reviewed and approved by the Architect and Owner. Such delays may result in time extensions to specific work or areas of work only, and not to other unaffected portion of the project. Such delays must directly effect the critical path of the work, be shown as unavoidable and be unable to be made up through rescheduling.

C. Occupancy: The project will be occupied by the District Staff as shown below. Dates are fixed and cannot be changed. The premises will be occupied whether or not the work is completed regardless of time extensions (if any).

   Any work performed after this date will need to be fully coordinated with the District and will be limited to after school hours or weekends.

D. Project Schedule:

The following schedule summarizes the major activity dates (Dates are approximate and actual start dates are subject to change):

Bid	**Dates**
Advertise to Bid (first)	10/5/24
Advertise to Bid (second)	10/12/24
Mandatory Pre-bid Meeting	10/15/24 at 11:00 AM
Addendum (last)	10/18/24
Bids Due	10/24/24 at 3:00 PM
Board Award	11/19/24

Contracts

Bond Preparation	11/26/24 – 12/3/24
Contract Execution	12/3/24

Pre-Construction Activities

Start Date	12/16/24
Submittals and Approvals	12/16/24 – 5/30/25
Materials Ordering/Stockpiling	12/16/24 – 5/30/25
School Concludes for Summer (last day)	5/30/25

Construction

Date of facility availability	6/2/25
Construction Period	6/2/25 – 7/27/25
Begin turning over spaces to District	7/21/25
Owner Slack Period	7/21/25 – 7/27/25

Occupancy In order to accommodate a phased occupancy by the Owner, the Contractor will turn the buildings over for occupancy as follows:

Occupancy - Staff	7/21/25
Occupancy - Students	7/28/25

Completion/Close-out

Substantial Completion Date	7/21/25
Complete Minor Finish Work	7/21/25 - 7/27/25
Complete Punch List Work	7/27/25
Close-out/Completion	7/27/25 – 8/15/25

1.06 CODES, REGULATIONS, AND STANDARDS

A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this 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.

B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.07 PROJECT RECORD DOCUMENTS

A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:

(1) Contract Drawings.

(2) Specifications.

(3) Addenda.

(4) Change Orders and other modifications to the Contract.

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

(6) Field test records.

(7) Inspection certificates.

(8) Manufacturer's certificates.

B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.

C. Contractor shall record information concurrent with construction progress.

D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) 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 Change Orders and written directives.

1.08 EXAMINATION OF EXISTING CONDITIONS

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

B. Prior to commencement of Work, Contractor shall survey photograph 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.

C. 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.

1.09 CONTRACTOR'S USE OF PREMISES

A. 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.

B. 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.

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

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

E. 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.

F. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.10 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. 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.

B. 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.

1.11 UTILITY SHUTDOWNS AND INTERRUPTIONS

A. 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. The 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.

B. 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.

1.12 STRUCTURAL INTEGRITY

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

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

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 21 00

ALLOWANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-specified work.

1.2 RELATED SECTIONS

A. Document 01 10 00 (Summary of Work)

B. Document 01 29 00 (Payments and Completion)

C. Document 01 32 19 (Submittal Procedures)

1.3 ALLOWANCES

A. Included in the Contract, a stipulated sum/price of 10% of Base Bid Amount as an allowance for Unforeseen Conditions within the limits set forth in the Bridging Documents. This Allowance shall not be utilized without written approval by the District.

B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding and equipment rental will be included in Allowance Expenditure Directive authorizing expenditure of funds from this Allowance.

C. Funds will be drawn from Allowance only with District approval evidenced by an Allowance Expenditure Directive.

D. At Contract closeout, funds remaining in Allowance will be credited to District by Change Order.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF DOCUMENT

DOCUMENT 01 22 00

ALTERNATES AND UNIT PRICING

PART 1 – ALTERNATES

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Bid Form and Proposal;

D. Instruction to Bidders.

1.02 DESCRIPTION

The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.

1.03 GENERAL

Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an item is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

1.04 BASE BID

The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

1.05 ALTERNATES

A. (none)

The above Alternate descriptions are general in nature and for reference purposes only. The Contract Documents, including, without limitation, the Drawings and Specifications, must be referred to for the complete scope of Work.

PART 2 - UNIT PRICING

2.01 GENERAL

Contractor shall completely state all required figures based on Unit Prices listed below. Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

2.02 UNIT PRICES

Furnish unit prices for each of the named items on a square foot, lineal foot, or per each basis, as applies. Unit prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and supplier(s).

A. _____

B. _____

END OF DOCUMENT

DOCUMENT 01 25 13

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. Instructions to Bidders;

B. General Conditions, including, without limitation, Substitutions For Specified Items; and

C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.

B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.

C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District’s Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.

D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:

(1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.

(2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.

E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.

F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.

G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.

H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

I. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 26 00

CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF DOCUMENT

DOCUMENT 01 29 00

APPLICATION FOR PAYMENT AND CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS

CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS IN THE GENERAL CONDITIONS RELATED TO APPLICATIONS FOR PAYMENT AND/OR PAYMENTS.

CONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: $_____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): $_____

(4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8134)

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: $_____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

CONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8136)

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:

Amount of Check: $_____

Check Payable to: _____

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: $_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8138)

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: $_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

DOCUMENT 01 31 19

PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions; and

B. Special Conditions.

1.02 PROGRESS MEETINGS:

A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.

B. Location: Contractor's field office.

C. The Contractor shall notify and invite the following entities ("Invitees"):

(1) District Representative.

(2) Contractor.

(3) Contractor's Project Manager.

(4) Contractor's Superintendent.

(5) Subcontractors, as appropriate to the agenda of the meeting.

(6) Suppliers, as appropriate to the agenda of the meeting.

(7) Construction Manager, if any.

(8) Architect

(9) Engineer(s), if any and as appropriate to the agenda of the meeting.

(10) Others, as appropriate to the agenda of the meeting.

D. The District's and/or the Architect's Consultants will attend at their discretion, in response to the agenda.

E. The District representative, the Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other concerned parties. If exceptions are taken to anything in the meeting notes,

those exceptions shall be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION/PERFORMANCE MEETING:

A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: cutting and patching of plaster and roofing, and other weather-exposed and moisture-resistant products[A1]. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.

B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.

C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.

D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 32 13

SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Summary of Work; and

D. Submittals.

1.02 SECTION INCLUDES

A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.

(1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").

(2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.

(3) Submit schedules and reports as specified in the General Conditions.

B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

A. Within ten (10) days of being awarded the Contract and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.

B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

C. Milestone Schedule:

ACTIVITY DESCRIPTION	REQUIRED COMPLETION
CONSTRUCTION STARTS	**[DATE]**
FINAL PROJECT COMPLETION	**[DATE]**

1.04 QUALIFICATIONS

A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of [i.e., Primavera Project Planner]. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.

(1) The written statement shall identify the individual who will perform CPM scheduling.

(2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.

(3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths (¾) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.

B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.

B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.

(1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.

(2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.

(3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to

have Project Float. The Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.

C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.

(1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.

(2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.

D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.

E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.

F. Software: Use **[i.e., District Project Planner for Windows, latest version]**. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.

G. Transmit each item under the form approved by District.

(1) Identify Project with District Contract number and name of Contractor.

(2) Provide space for Contractor's approval stamp and District's review stamps.

(3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.

B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.

C. Initial CPM Schedule shall be time scaled.

D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.

E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.

(1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).

(2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.

F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.

B. Progress Schedule shall include or comply with following requirements:

(1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.

(2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.

(a) Activity durations shall be total number of actual work days required to perform that activity.

(3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.

(4) District furnished materials and equipment, if any, identified as separate activities.

(5) Activities for maintaining Project Record Documents.

(6) Dependencies (or relationships) between activities.

(7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.

(a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.

(b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.

(8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.

(a) Include time for fabrication and delivery of manufactured products for the Work.

(b) Show dependencies between procurement and construction.

(9) Activity description; what Work is to be accomplished and where.

(10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.

(11) Resources required (labor and major equipment) to perform each activity.

(12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.

(13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.

(14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.

(15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.

(16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.

(a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.

(b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.

(c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.

(d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.

(17) Activity durations shall be in Work days.

(18) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.

C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.

(1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.

(2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:

(a) Clarifications of Contract Requirements.

(b) Directions to include activities and information missing from submittal.

(c) Requests to Contractor to clarify its schedule.

(3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.

(1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:

(a) Accept schedule and cost and resource loaded activities as submitted, or

(b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.

(2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.

(3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.

(4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.

(1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.

(2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.

(3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.

C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.

D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.

(1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.

(2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.

B. A meeting will be held on approximately the twenty-fifth (25th) of each month to review the schedule update submittal and progress payment application.

(1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.

(2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.

(3) Contractor shall plan on the meeting taking no less than four (4) hours.

C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.

D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.

(1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.

(2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.

E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.

B. To reflect revisions to the Schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.

C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.

D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.

E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.

B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.

C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.

D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACT EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.

B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.

C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.

D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.

B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14)

calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.

C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.

D. No time will be granted under this Contract for cumulative effect of changes.

E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.

F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.

G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.

B. Required Reports:

(1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.

(2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.

(3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.

(4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.

(5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

C. Other Reports:

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

(1) Activities by early start.

(2) Activities by late start.

(3) Activities grouped by Subcontractors or selected trades.

(4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.

B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:

(1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.

(2) Progress made on critical activities indicated on CPM Schedule.

(3) Explanations for any lack of work on critical path activities planned to be performed during last month.

(4) Explanations for any schedule changes, including changes to logic or to activity durations.

(5) List of critical activities scheduled to be performed next month.

(6) Status of major material and equipment procurement.

(7) Any delays encountered during reporting period.

(8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.

(a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.

(b) Contractor shall explain all variances and mitigation measures.

(9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.

(10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and man-hours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

A. Project name and Project number.

B. Contractor's name and address.

C. Weather, temperature, and any unusual site conditions.

D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.

E. Worker quantities for its own Work force and for Subcontractors of any tier.

F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;

B. Special Conditions.

1.02 SECTION INCLUDES:

A. Definitions:

(1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.

(2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.

(3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.

B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:

(1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.

(2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.

(3) Contractor shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.

(4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.

(5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and "cuts" shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.

(6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.

(7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. Also certify that Contractor-furnished equipment can be installed in allocated space. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Submittals shall not be used as a means of requesting a substitution.

(8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.

(9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

C. Submittal Schedule:

(1) Contractor shall prepare its proposed submittal schedule that is coordinated with the proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.

(2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revise and resubmit", etc.

(3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule.

(4) Contractor may be assessed $100 a day for each day it is late in submitting a shop drawing or sample. No extensions of time will be granted to Trade Contractor or any Subcontractor because of its failure to have shop drawings and samples submitted in accordance with the Schedule.

1.03 SHOP DRAWINGS:

A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.

B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.

C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.

D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.

E. District shall not review Shop Drawings for quantities of materials or number of items supplied.

F. District's and/or Architect’s review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. The District’s and/or Architect’s review of Shop Drawings is not to be construed as approving departures from Contract Documents.

G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.

H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.

I. Submitted drawings and details must bear stamp of approval of Contractor:

(1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.

(2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.

J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.

K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.

L. Shop Drawings must clearly delineate the following information:

(1) Project name and address.

(2) Specification number and description.

(3) Architect's name and project number.

(4) Shop Drawing title, number, date, and scale.

(5) Names of Contractor, Subcontractor(s) and fabricator.

(6) Working and erection dimensions.

(7) Arrangements and sectional views.

(8) Necessary details, including complete information for making connections with other Work.

(9) Kinds of materials and finishes.

(10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.

M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.

(1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.

(2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON-REPRODUCIBLE SUBMITTALS:

A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contract must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.

B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.

C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.

D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.

E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES:

A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.

B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.

(1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.

(2) Samples must show full range of texture, color, and pattern.

C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.

D. Samples to be shipped prepaid or hand-delivered to the District.

E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.

F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.

G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.

H. After a material has been approved, no change in brand or make will be permitted.

I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.

J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.

K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:

(1) Size: As Specified.

(2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS:

A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.

B. One (1) copy of product or materials data will be returned to Contractor with the review status.

C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.

D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.

E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.

F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.

G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.

H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.

I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 35 13.23

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;

B. Special Conditions;

C. Drug-Free Workplace Certification;

D. Tobacco-Free Environment Certification;

E. Criminal Background Investigation/Fingerprinting Certification;

F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT:

A. Drug-Free Schools and Safety Requirements:

(1) All school sites and other District Facilities have been declared "Drug-Free Zones." No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.

(2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.

(3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.

B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.

C. Disturbing the Peace (Noise and Lighting):

(1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.

(2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.

(3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

(1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.

(2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.

(3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.

(4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.

E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;

B. Special Conditions; and

C. Quality Control.

1.02 DESCRIPTION:

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").

(1) California Building Standards Administrative Code, Part 1, Title 24, CCR.

(2) California Building Code (CBC), Part 2, Title 24, CCR; (International Building Code volumes 1-2 and California Amendments).

(3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).

(4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).

(5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).

(6) California Fire Code (CFC), Part 9, Title 24, CCR; (International Fire Code and California Amendments).

(7) California Referenced Standards Code, Part 12, Title 24, CCR.

(8) State Fire Marshal Regulations, Public Safety, Title 19, CCR.

(9) Partial List of Applicable National Fire Protection Association (NFPA) Standards:

(a) NFPA 13 - Automatic Sprinkler System.

(b) NFPA 14 - Standpipes Systems.

(c) NFPA 17A - Wet Chemical System

(d) NFPA 24 - Private Fire Mains.

(e) (California Amended) NFPA 72 - National Fire Alarm Codes.

(f) NFPA 253 - Critical Radiant Flux of Floor Covering System.

(g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.

(10) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:

(a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.

(b) DSA IR A-7 — Project Inspector Certification and Approval.

(c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.

(d) DSA IR A-12 — Assistant Inspector Approval.

(11) DSA Procedures ("DSA PR")

(a) DSA PR 13-01 – Construction Oversight Process

(b) DSA PR 13-02 – Project Certification Process

B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

(1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.

(2) Special inspections per Section 4-333(c).

(3) Deferred Approvals per section 4-317(g).

(4) Verified reports per Sections 4-336 & 4-343(c).

(5) Duties of the Architect & Engineers shall be per Sections 4-333(a) and 4-341.

(6) Duties of the Contractor shall be per Section 4-343.

(7) Duties of Project Inspector shall be per Section 4-334.

(8) Addenda and Construction Change Documents per Section 4-338.

Contractor shall keep and make available all applicable parts of the most current version of Title 24 referred to in the plans and specifications at the Site during construction.

C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.

(1) Contractor shall submit the following to Architect for review and endorsement:

(a) Product information on proposed material/system supplier.

(b) Drawings, specifications, and calculations prepared, signed, and stamped by an architect or engineer licensed in the State of California for that portion of the Work.

(c) All other requirements as may be required by DSA.

(2) Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor.

(3) Contractor shall not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.

(4) Schedule of Work Subject to DSA Deferred Approval: Window wall systems exceeding 10 feet in span.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 42 13

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions including without limitation, Definitions;

B. Special Conditions.

1.02 DOCUMENT INCLUDES:

A. Abbreviations used throughout the Contract Documents.

B. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	The Aluminum Association
2.	AAMA	American Architectural Manufacturers Association
3.	AASHTO	American Association of State Highway and Transportation Officials
4.	ABPA	Acoustical and Board Products Association
5.	ACI	American Concrete Institute
6.	AGA	American Gas Association
7.	AGC	Associated General Contractors of America
8.	AHC	Architectural Hardware Consultant
9.	AI	Asphalt Institute
10.	AIA	American Institute of Architects
11.	AIEE	American Institute of Electrical Engineers
12.	AISC	American Institute of Steel Construction
13.	AISI	American Iron and Steel Institute
14.	AMCA	Air Moving and Conditioning Association
15.	ANSI	American National Standards Institute
16.	APA	American Plywood Association
17.	ARI	Air Conditioning and Refrigeration Institute
18.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
19.	ASME	American Society of Mechanical Engineers
20.	ASSE	American Society of Structural Engineers
21.	ASTM	American Society of Testing and Materials
22.	AWPB	American Wood Preservers Bureau
23.	AWPI	American Wood preservers Institute
24.	AWS	American Welding Society
25.	AWSC	American Welding Society Code
26.	AWI	Architectural Woodwork Institute
27.	AWWA	American Water Works Association
28.	BIA	Brick Institute of America

29.	CCR	California Code of Regulations
30.	CLFMI	Chain Link Fence Manufacturers Institute
31.	CMG	California Masonry Guild
32.	CRA	California Redwood Association
33.	CRSI	Concrete Reinforcing Steel Institute
34.	CS	Commercial Standards
35.	CSI	Construction Specifications Institute
36.	CTI	Cooling Tower Institute
37.	FGMA	Flat Glass Manufacturer's Association
38.	FIA	Factory Insurance Association
39.	FM	Factory Mutual
40.	FS	Federal Specification
41.	FTI	Facing Title Institute
42.	GA	Gypsum Association
43.	ICC	International Code Council
44.	IEEE	Institute of Electrical and Electronic Engineers
45.	IES	Illumination Engineering Society
46.	LIA	Lead Industries Association
47.	MIA	Marble Institute of America
48.	MLMA	Metal Lath Manufacturers Association
49.	MS	Military Specifications
50.	NAAMM	National Association of Architectural Metal Manufacturers
51.	NBHA	National Builders Hardware Association
52.	NBFU	National Board of Fire Underwriters
53.	NBS	National Bureau of Standards
54.	NCMA	National Concrete Masonry Association
55.	NEC	National Electrical Code
56.	NEMA	National Electrical Manufacturers Association
57.	NFPA	National Fire Protection Association/National Forest Products Association
58.	NMWIA	National Mineral Wool Insulation Association
59.	NTMA	National Terrazzo and Mosaic Association
60.	NWMA	National Woodwork Manufacturer's Association
61.	ORS	Office of Regulatory Services (California)
62.	OSHA	Occupational Safety and Health Act
63.	PCI	Precast Concrete Institute
64.	PCA	Portland Cement Association
65.	PDCA	Painting and Decorating Contractors of America
66.	PDI	Plumbing Drainage Institute
67.	PEI	Porcelain Enamel Institute
68.	PG&E	Pacific Gas & Electric Company
69.	PS	Product Standards
70.	SDI	Steel Door Institute; Steel Deck Institute
71.	SJI	Steel Joist Institute
72.	SSPC	Steel Structures Painting Council
73.	TCA	Tile Council of America
74.	TPI	Truss Plate Institute
75.	UBC	Uniform Building Code
76.	UL	Underwriters Laboratories Code
77.	UMC	Uniform Mechanical Code
78.	USDA	United States Department of Agriculture
79.	VI	Vermiculite Institute

80.	WCLA	West Coast Lumberman's Association
81.	WCLB	West Coast Lumber Bureau
82.	WEUSER	Western Electric Utilities Service Engineering Requirements
83.	WIC	Woodwork Institute of California
84.	WPOA	Western Plumbing Officials Association

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions including without limitation, Definitions;

B. Special Conditions.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents or are required by applicable codes.

B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.

C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.

D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.

E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and/or the Architect before proceeding.

F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.

G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

END OF DOCUMENT

DOCUMENT 01 42 19

REFERENCES

PART 1 - GENERAL

1.01 SCHEDULE OF REFERENCES:

The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.

AA	The Aluminum Association 1400 Crystal Drive, Suite 430 Arlington, VA 22202 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 1518 K Street, NW, Suite 503 Washington, DC 20005 www.aabc.com	202/737-0202
AAMA	American Architectural Manufacturers Association 1827 Walden Office Sq., Suite 550 Schaumburg, IL 60173-4268 www.aamanet.org	847/303-5664
AASHTO	American Association of State Highway and Transportation Officials 444 N Capitol St. NW - Suite 249 Washington, DC 20001 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 One Davis Drive Research Triangle Park, NC 27709 2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 1500 Rhode Island Ave., NW Washington DC, 20005 www.paint.org	202/462-6272

ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.concrete.org	248/848-3700
ACPA	American Concrete Pipe Association 8445 Freeport Parkway, Suite 350 Irving, TX 75063-2595 www.concrete-pipe.org	972/506-7216
ADC	Air Duct Council 1901 N. Roselle Road, Suite 800 Schaumburg, Illinois 60195 www.flexibleduct.org	847/706-6750
AF&PA	American Forest and Paper Association 1101 K Street, NW, Suite 700 Washington, DC 20005 www.afandpa.org	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW Washington, DC 20001 www.aga.org	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 300 Arlington, VA 22201 www.agc.org	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 domensino.com/AHA/default.htm	847/934-8800
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 www.asphaltinstitute.org	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 www.aia.org	202/626-7300
AISC	American Institute of Steel Construction 130 East Randolph Street Suite 2000 Chicago, IL 60601 www.aisc.org	312.670.2400

AIA	American Insurance Association (formerly the National Board of Fire Underwriters) 555 12th St, NW, Suite 550 Washington DC 20004 www.aiadc.org	202/828-7100
AISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 www.steel.org	202/452.7100
AITC	American Institute of Timber Construction 7012 S. Revere Parkway Suite 140 Centennial, CO 80112 www.aitc-glulam.org	503/639.0651
ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 www.assoc-labs.com	214/565-0593
ALSC	American Lumber Standards Committee, Inc. 7470 New Technology Way, Suite F Frederick, MD 21703 www.alsc.org	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 www.amca.org	847/394-0150
ANLA	American Nursery & Landscape Association (now AmericanHort) 525 9th St NW, Suite 80 Washington, DC 20004 www.americanhort.org	202/789-2900
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC, 20036 www.ansi.org	202/293.8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253/565-6600

APA	Architectural Precast Association 325 John Know Rd, Ste L103 Tallahassee, FL 32303 www.archprecast.org	850/205.5637
ARI	Air Conditioning and Refrigeration Institute (now Air-Conditioning, Heating, & Refrigeration Institute) 2111 Wilson Blvd, Suite 500 Arlington, VA 22201 www.ahrinet.org	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association Public Information Department 750 National Press Building 529 14th Street, NW Washington, DC 20045 www.asphaltroofing.org	202/591-2450
ASA	The Acoustical Society of America ASA Office Manager Suite 1NO1 2 Huntington Quadrangle Melville, NY 11747-4502 http://asa.aip.org	516/576-2360
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 www.asce.org	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329-2305 www.ashrae.org	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 www.asla.org	202/898-2444
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016-5990 www.asme.org	800/434-2763
ASPE	American Society of Plumbing Engineers 2980 S River Rd. Des Plaines, IL 60018 http://aspe.org	847/296-0002

ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 http://asq.org	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 901 Canterbury, Suite A Westlake, Ohio 44145 www.asse-plumbing.org	440/835-3040
ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 www.astm.org	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 www.awci.org	703/538-1600
AWPA	American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077
AWPI	American Wood Preservers Institute 2750 Prosperity Ave. Suite 550 Fairfax, VA 22031-4312 www.arcat.com	800/356-AWPI 703/204-0500
AWS	American Welding Society 8669 Doral Boulevard, Suite 130 Doral, Florida 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794 7711

BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 1850 Centennial Park Drive, Suite 301 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 14501 George Carter Way, Suite 103 Chantilly VA 20151-2923 www.cganet.com	703/788-2700
CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 1064 Delaware Avenue SE Atlanta, GA 30316 www.cispi.org	404/622-0073
CLFMI	Chain Link Fence Manufacturers Institute 10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 www.associationsites.com/main-pub.cfm?usr=clfma	410/290-6267
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 www.compositepanel.org	703/724-1128
CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814 www.cpsc.gov	301/504-7923 800/638-2772
CRA	California Redwood Association 405 Enfrente Drive, Suite 200 Novato, CA 94949 www.calredwood.org	415/382-0662

CRI	Carpet and Rug Institute P.O. Box 2048 Dalton, Georgia 30722-2048 www.carpet-rug.org	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173 4758 www.crsi.org	847/517-1200
CSI	The Construction Specifications Institute 110 South Union Street, Suite 100 Alexandria VA 22314 www.csinet.org	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 www.ctioa.org	310/574-7800
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 14150 Newbrook Dr. Chantilly, VA 20151 www.dhi.org	703/222-2010
DIPRA	Ductile Iron Pipe Research Association 2000 2nd Avenue, South Suite 429 Birmingham, AL 35233 www.dipra.org	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, D.C. 20230 www.commerce.gov	202/482-2000
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 www.dot.gov	855/368-4200
EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 www.ejma.org	914/332-0040

EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 www.epa.gov	202/272-0167
FCICA	Floor Covering Installation Contractors Association 7439 Millwood Drive West Bloomfield, MI 48322 www.fcica.com	248/661-5015 877/TO-FCICA
FM Global	Factory Mutual Insurance Company Amy Daley Global Practice Leader – Education, Public Entities, Health Care FM Global 270 Central Avenue Johnston, RI 02919-4949 www.fmglobal.com	401/275-3000 401/275-3029
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	202/619-8925
GA	The Gypsum Association 6525 Belcrest Road, Suite 480 Hyattsville, MD 20782 www.gypsum.org	301/277-8686
GANA	Glass Association of North America 800 SW Jackson St., Suite 1500 Topeka, KS 66612-1200 www.glasswebsite.com	785/271-0208
HMA	Hardwood Manufacturers Association 665 Rodi Road, Suite 305 Pittsburgh, PA 15235 http://hmamembers.org	412/244-0440
HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org	703/435-2900

IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900
IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MIA	Marble Institute of America 28901 Clemens Rd, Ste 100 Cleveland, OH 44145 www.marble-institute.com	440/250-9222
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889

MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602 http://mss-hq.org	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.naamm.org	630/942-6591
NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314 www.naima.org	703/684-0084
NAPA	National Asphalt Pavement Association 5100 Forbes Blvd. Lanham, MD USA 20706-4407 www.asphaltpavement.org	888/468-6499 301/731-4748
NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 LB9 Dallas, TX 75244 www.ncspa.org	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 www.ncma.org	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	301/977-3698
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814 www.necanet.org	301/657-3110
NEMA	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1752 Rosslyn, Virginia 22209 www.nema.org	703/841-3200

NEII	National Elevator Industry, Inc. 1677 County Route 64 P.O. Box 838 Salem, New York 12865-0838 www.neii.org	518/854-3100
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, Massachusetts USA 02169-7471 www.nfpa.org	617/770-3000
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818
NIA	National Insulation Association 12100 Sunset Hills Road, Suite 330 Reston, VA 20190 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070
NSF	NSF International P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA www.nsf.org	800/673-6275 734/769-8010
NTMA	National Terrazzo and Mosaic Association PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, D.C. 20210 www.osha.gov	800/321-OSHA (6742)

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 500 New Jersey Ave., N.W. 7th Floor Washington, D.C. 20001 www.cement.org	847/966-6200 202/408-9494
PCI	Precast/Prestressed Concrete Institute 200 W. Adams St. #2100 Chicago, IL 60606 www.pci.org	312/786-0300
PDCA	Painting and Decorating Contractors of America 2316 Millpark Drive, Ste 220 Maryland Heights, MO 63043 www.pdca.com	800/332-PDCA (7322) 314/514-7322
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 http://pdionline.org	978/557-0720 800/589-8956
PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 www.porcelainenamel.com	770/676-9366
PG&E	Pacific Gas & Electric Company www.pge.com	800/743-5000
PLANET	Professional Landcare Network 950 Herndon Parkway, Suite 450 Herndon, Virginia 20170 www.landcarenetwork.org	703/736-9666 800/395-2522 703/736-9668
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange GA 30240 www.rfci.com	706/882-3833
RIS	Redwood Inspection Service 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 www.redwoodinspection.com	925/935-1499
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 www.sdi.org	847/458-4647

SDI	Steel Door Institute 30200 Detroit Road Westlake, Ohio 44145 www.steeldoor.org	440/899-0010
SJI	Steel Joist Institute 234 W. Cheves Street Florence, SC 29501 http://steeljoist.org	843/407-4091
SMA	Stucco Manufacturers Association 500 East Yale Loop Irvine, CA 92614 www.stuccomfgassoc.com	949/387.7611
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, Virginia 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1667 K St., NW, Suite 1000 Washington, DC 20006 www.plasticsindustry.org	202/974-5200
SSPC	Society for Protective Coatings (formerly the Steel Structures Painting Council) 40 24th St 6th Fl Pittsburgh, PA 15222 www.sspc.org	412/281-2331 877/281-7772
TCA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 218 North Lee Street, Suite 312 Alexandria, VA 22314 www.tpinst.org	703/683-1010
TPI	Turfgrass Producers International 2 East Main Street East Dundee, IL 60118 www.turfgrasssod.org	800/405-8873 847/649-5555

TCIA	Tree Care Industry Association (formerly the National Arborist Association) 136 Harvey Road, Suite 101 Londonderry, NH 03053 www.tcia.org	800/733-2622
TVI	The Vermiculite Institute c/o The Schundler Company 150 Whitman Avenue Edison, NJ. 08817 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association 2711 LBJ Freeway, Suite 1000 Dallas, TX 75234 www.uni-bell.org	972/243-3902
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 www.usda.gov	202/720-2791
WA	Wallcoverings Association 401 North Michigan Avenue Suite 2200 Chicago, IL 60611 www.wallcoverings.org	312/321-5166

WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97281 or 6980 S.W. Varns Tigard, OR 97223 www.wclib.org	503/639-0651
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, New York 10017 www.wcmanet.org	212/297-2122
WDMA	Window & Door Manufacturers Association 401 N. Michigan Avenue, Suite 2200 Chicago, IL 60611 or 2025 M Street, NW, Ste. 800 Washington, D.C. 20036-3309 www.wdma.com	312/321-6802 202/367-1157
WI	Woodwork Institute P.O. Box 980247 West Sacramento, CA 95798 www.wicnet.org	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street Hartford, CT 06103 www.wirereinforcementinstitute.org	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, California 92865 www.wwcca.org	714/221-5520
WWPA	Western Wood Products Association 522 SW Fifth Ave., Suite 500 Portland, OR 97204-2122 www2.wwpa.org	503/224-3930

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 43 00

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Purchase of Materials and Equipment;

B. Special Conditions;

C. Imported Materials Certification.

1.02 MATERIAL AND EQUIPMENT

A. Only items approved by the District and/or Design Professional shall be used.

B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

1.03 MATERIAL AND EQUIPMENT COLORS

A. The District and/or Architect will provide a schedule of colors.

B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.

B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.

C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.

D. Materials are not acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.

E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, access to the Site or buildings, and underground services. Contractor shall protect material and equipment furnished under Contract.

F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.

G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.

B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

2.02 FACILITIES AND EQUIPMENT

Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

2.03 MATERIAL REFERENCE STANDARDS

Where material is specified solely by reference to "standard specifications" and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).

B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

3.02 COORDINATION

A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.

B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

3.03 COMPLETENESS

Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

3.04 APPROVED INSTALLER OR APPLICATOR

Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

3.05 MANUFACTURER'S RECOMMENDATIONS

All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF DOCUMENT

DOCUMENT 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;

B. Special Conditions.

1.02 RELATED CODES:

A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.

B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION:

A. The District and Architect or their appointed representatives 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 and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.

B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:

(1) The Project Inspector and Special Inspector(s) 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. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.

(2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.

(3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also 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 Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES:

A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.

B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."

C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing 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.

1.05 TESTS AND INSPECTIONS:

A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.

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

C. The District will pay for first inspections and tests required by the "CCR", and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:

(1) Tests and observations for earthwork and paving.

(2) Tests for concrete mix designs, including tests of trial batches.

(3) Tests and inspections for structural steel work.

(4) Field tests for framing lumber moisture content.

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

(6) Tests and observations of welding and expansion anchors.

D. The District may at its discretion, pay and then back charge the Contractor for:

(1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.

(2) Uncovering of work in accordance with Contract Documents.

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

(4) Testing done off Site.

E. Testing and inspection reports and certifications:

(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.

(a) The District;

(b) The Construction Manager, if any;

(c) The Architect;

(d) The Consulting Engineer, if any;

(e) Other engineers on the Project, as appropriate;

(f) The Project Inspector; and

(g) The Contractor.

(2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 - PRODUCTS

2.01 TYPE OF TESTS AND INSPECTIONS

A. Testing and inspection shall be in accordance with DSA Form 103 (or current version)

B. Slump Test
ASTM C 143

C. Concrete Tests

Testing agency shall test concrete used in the work per the following paragraphs:

(1) Compressive Strength:

(a) Minimum number of tests required: One (1) set of three (3) cylinders for each 100 cubic yards (Sec. 2604(h) 01) of concrete or major fraction thereof, placed in one (1) day. See Title 24, Section 2605(g).

(b) Two cylinders of each set shall be tested at twenty-eight (28) days. One (1) cylinder shall be held in reserve and tested only when directed by the Architect or District.

(c) Concrete shall test the minimum ultimate compressive strength in twenty-eight 28 days, as specified on the structural drawings.

(d) In the event that the twenty-eight (28) day test falls below the minimum specified strength, the effective concrete in place shall be tested by taking cores in accordance with UBC Standard No. 26-13 and tested as required for cylinders.

(e) In the event that the test on core specimens falls below the minimum specified strength, the concrete will be deemed defective and shall be removed and replaced upon such direction of the Architect, and in a manner acceptable to the Division of the State Architect.

D. Reinforcing, Steel

E. Structural Steel Per Title 24 and as noted:

(1) Material: Steel per Table in Title 24, Section 2712.

(2) Qualification of Welders (UBC Std. 27-6).

(3) Shop fabrication (Section 2712(d). Structural steel only).

(4) Shop and field welding (Section 2712(e)).

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Site Standards; and

D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES:

A. Electric Power and Lighting:

(1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.

(2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.

(3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.

(4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.

B. Heat and Ventilation:

(1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to

protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.

(2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.

(3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

(1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s), on the Site, or other location approved by the local water agency, to point of intended use.

(2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.

(3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

(1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.

(2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

(1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work. Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.

(2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

(1) Contractor 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 Fire, State Fire Marshall and/or its designee.

(2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

(1) Contractor shall provide trash removal on a timely basis**.** Under no circumstance shall Contractor use District trash service.

H. Field Office:

(1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use the corridor adjacent to the construction area for an office area, if approved in writing by District.

(2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

I. Temporary Facilities:

(1)

1.03 CONSTRUCTION AIDS:

A. Plant and Equipment:

(1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.

(2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES:

A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.

B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.

C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.

D. Tree and Plant Protection:

(1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.

(2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.

(3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.

(4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.

(5) Excavation around Trees:

(a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.

(b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and

larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.

(c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.

(d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.

(e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.

(f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY:

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS:

A. Noise Control:

(1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.

(2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

(1) Equipment and impact tools shall have intake and exhaust mufflers.

(2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

(1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.

(2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.

(3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.

(4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

(1) Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

(1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.

(2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

(1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S):

A. General:

(1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.

(2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

(1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.

(2) Sign Surface: Minimum 3/4-inch exterior grade plywood.

(3) Rough Hardware: Galvanized.

(4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

(1) Contractor shall fabricate to provide smooth, even surface for painting.

(2) Size: 4'-0" x 8'-0", unless otherwise indicated.

(3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.

(4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES:

A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

DOCUMENT 01 50 13

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

A. Administrative and procedural requirements for the following:

(1) Salvaging non-hazardous construction waste.

(2) Recycling non-hazardous construction waste.

(3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS:

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS:

A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of sixty-five percent (65%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS:

A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:

(1) Material category.

(2) Generation point of waste.

(3) Total quantity of waste in tons or cubic yards.

(4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.

(5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.

(6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.

(7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. CHPS Submittal: CHPS letter template for Credit ME2.0 and ME2.1, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.[A1]

I. Qualification Data: For Waste Management Coordinator.

J. 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.

K. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE:

A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:

(1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.

(2) Review requirements for documenting quantities of each type of waste and its disposition.

(3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

(4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.

(5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN:

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measurement throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

(1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

(2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

(3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

(4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

(5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

(6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION:

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

(1) Comply with Document 01 50 00 for operation, termination, and removal requirements.

B. **[**Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.**]**

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

(1) Distribute waste management plan to everyone concerned within 3 days of submittal return.

(2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

(1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

(2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE:

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

(1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.

(a) Inspect containers and bins for contamination and remove contaminated materials if found.

(2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

(3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.

(4) Store components off the ground and protect from the weather.

(5) Remove recyclable waste off District property and transport to recycling receiver or processor.

D. Packaging:

(1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

(2) Polystyrene Packaging: Separate and bag material.

(3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.

(4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

E. Site-Clearing Wastes: Chip brush, branches, and trees on site.

F. Wood Materials:

(1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.

(2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

(1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE:

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

(1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.

(2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF DOCUMENT

DOCUMENT 01 52 13

FIELD OFFICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

A. Requirements for Field Offices and Field Office Trailers.

1.03 SUMMARY:

A. General: Contractor shall provide District's Field Office Trailer and contents, for District's use exclusively, during the term of the Contract.

B. Property: Trailer, furniture, furnishings, equipment, and the like, supplied by the Contractor with the Office Trailer shall remain the property of the Contractor; District property items installed, delivered, and the like by District within the Office Trailer will remain District's property.

C. Modifications: District reserves the right to modify the trailer or contents, or both, as may be deemed proper by District.

D. Condition: Trailer and contents shall be clean, neat, substantially finished, in good, proper, and safe condition for use, operation, and the like; the trailer and contents shall not be required to be new.

E. Installation Timing: Provide safe, fully furnished, functional, proper, complete, and finished trailer properly ready for entire use, within fourteen (14) calendar days of District's notification of the issuance of Notice to Proceed.

1.04 SUBMITTALS:

A. General: Submit submittals to District in quantity, format, type, and the like, as specified herein.

B. Office Trailer Data: One (1) copy of manufacturer's descriptive data, technical descriptions, regulatory compliance, industry standards, installation, removal, and maintenance instructions.

C. Equipment Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.

D. Furniture and Furnishings Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.

E. Plans: One (1) reproducible copy of appropriately scaled plans of trailer layout. Plans shall include, but not be limited to: lighting; furniture; equipment; telephone and electrical outlets; and the like.

F. Product Samples: One (1) complete and entire unit of each type, if directed by District.

1.05 QUALITY ASSURANCE

A. Standards: In the event that provisions of codes, regulations, safety orders, Contract Documents, referenced manufacturer's specifications, manufacturer's instructions, industry standards, and the like, are in conflict, the more restrictive and higher quality shall govern.

B. Installer: Installer or Installers engaged by Contractor must have a minimum of five (5) years of documented and properly authenticated successful experience of specialization in the installation of the items or systems, or both, specified herein.

C. Manufacturer: Contractor shall obtain products from nationally and industry recognized Manufacturer with five (5) years minimum, of immediately recent, continuous, documented and properly authenticated successful experience of specialization in the manufacture of the product specified herein.

D. State Personnel Training: Provide proper training for maintenance and operations, including emergency procedures, and the like, as directed by District.

E. Units: Shall be sound and free of defects, and shall not include any damage or defect that will impair the safety, installation, performance, or the durability of the entire Office Trailer and appurtenant systems.

1.06 REGULATORY REQUIREMENTS

A. General: Work shall be executed in accordance with applicable Codes, Regulations, Statutes, Enactments, Rulings, Laws, each authority having jurisdiction, and including, but not limited to, Regulatory Requirements specified herein.

B. California Building Standards Code ("CBSC").

C. California Code of Regulations, Title 25, Chapter 3, Sub Chapter 2, Article 3 ("CCR").

D. Coach Insignia: Trailer shall display California Commercial Coach Insignia; such insignia shall be deemed to show that the trailer is in accordance with the Construction and Fire Safety requirements of CCR.

PART 2 – PRODUCTS

2.01 FIELD OFFICE TRAILER

A. General: Provide entire Field Office Trailer of type, function, operation, capacity, size, complete with controls, safety devices, accessories, and the like, for proper and durable installation. Partitions, walls, ceiling, and other interior and exterior surfaces shall be appropriately finished, including, but not limited to, trim, painting, wall base, floor covering, suspended or similar ceiling, and the like; provide systems, components, units, nuts, bolts, screws, anchoring devices, fastening devices, washers, accessories, adhesives, sealants, and other items of type, grade, and class required for the particular use, not identified but required for a complete, weather-tight, appropriately operating, and finished installation.

B. Manufacturers: General Electric Capital Modular Space; The Space Place, Inc.; or equal.

C. Program: Provide a wheel-mounted trailer with stairs, landings, platforms, ramps, and the like, in good, proper, safe, clean, and properly finished condition; with proper heavy duty locks, and other proper and effective security at all doors, windows, and the like. Trailer shall be maintained in good, proper, safe, clean, and properly finished condition during the Contract.

(1) Nominal Trailer Size: Four hundred eighty (480) square feet, minimum.

(2) Stairs, Platform: Properly finished stairs, platforms, and ramps.

(3) Doors: Two (2), three (3) foot wide exterior doors with locksets; finished ramp, steps, and entry platform at each exterior door.

(4) Keys: Submit five (5) keys for each door, window, furniture unit, and the like. There shall be no other key copies or originals available; each key shall be identified for District; and shall be labeled, or tagged or both, as directed by District.

(5) HVAC:

(6) Lighting: Sixty-five (65) foot-candles illumination minimum at any point, at thirty (30) inches above finished floor throughout from fluorescent light source, exclusively, or as directed by District.

(7) Electrical Outlets: One (1) duplex outlet evenly spaced every twelve (12) linear horizontal feet of wall face, and electrical service ready for use.

(8) Telephones and Telephone Outlets: Two (2) telephone lines wired, connected to telephone utility service, and ready for use, and two (2) telephone instruments, each with two (2)-line capability, speed dial and hands-free feature. Locate each outlet as directed by District.

(9) Voicemail Messaging System or Answering Machine: One (1) unit, two (2)-line; digital.

2.02 FIELD OFFICE TRAILER ITEMS

A. General: Provide the Field Office Trailer with the following arranged into two (2) workstations:

(1) Desks: Two (2) desks: thirty-six (36) inches by sixty (60) inches; steel, laminated plastic top; locking, one (1) or two (2) file drawers single pedestal; steel; provide five (5) keys to District.

(2) Tables: Two (2) tables; thirty-six (36) inches by sixty (60) inches; twenty-nine (29) inches high; steel, laminated plastic top tables; one (1) at each desk.

(3) Chairs: Two (2) chairs: swivel; steel; with seat cushion and arms; one (1) at each desk.

(4) Waste Baskets: Two (2) waste baskets, one at each desk.

B. Furniture and Equipment: Provide in the space located to effect efficient and logical use.

(1) File cabinet: One (1); four (4) drawer; lateral; steel locking.

(2) Plan Table: One (1) plan table: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawers.

(3) Drafting Stool: One (1) drafting stool; swiveling; steel; padded; adjustable; with footrest and casters.

(4) Bookshelf: One (1) bookshelf: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawer.

(5) Plan Rack: One (1) wheel mounted plan rack.

(6) Waste Baskets: One (1) large waste basket.

(7) Coat/Hat Hanger: Wall mounted with minimum capacity for four (4) garments and ten (10) hats.

(8) Document Management System: Shall include an integrated high-volume printer, copier, and facsimile machine, including stand, base, and storage cabinet; and shall include the following features:

(a) Type: Laser, dry electrostatic transfer, plain paper, digital, multi-function imaging system.

(b) Network: Ethernet or Token Ring network ready, Plug-and-Play.

(c) Print, send/receive facsimile from any connected workstation.

(d) Resolution: Six hundred (600) dots per inch by six hundred (600) dots per inch, minimum.

(e) Print Speed: Twenty (20) pages per minute, minimum.

(f) Copies: Twenty (20) copies per minute, minimum.

(g) Document Handler: Forty (40) sheet, minimum

(h) Collator: Forty (40) bin, minimum, with stapling.

(i) Duplexing: Capable.

(j) Paper Size: Capable of handling paper sizes to eleven (11) inches by seventeen (17) inches.

(k) Paper Cassettes: One (1) each for eight and one half (8.5) inches by eleven (11) inches, eight and one half (8.5) inches by fourteen (14) inches, and eleven (11) inches by seventeen (17) inches paper sizes; minimum two hundred fifty (250) sheets per cassette.

(l) Reduction/Enlargement: Capable of reduction to twenty-five percent (25%) and enlargement to two hundred percent (200%).

(m) Facsimile Electronic Storage: Capable of storing minimum of fifty (50) speed dial numbers, group faxing and broadcast faxing.

(n) Facsimile Scanning: Capable of scanning into memory a minimum of one hundred (100) pages with maximum scan time of three (3) seconds per page.

(o) Halftone: Sixty-four (64) levels.

(p) Redial: Automatic and Manual.

(9) Maintenance: Contractor shall purchase service agreements for each unit of equipment for the duration of the project plus two (2) months, and shall maintain all equipment in proper working condition. Service agreements shall include provision for replacement of toner cartridges and other items required to effect proper unit use. Service agreements shall also provide for:

(a) Unlimited Service Calls.

(b) Same Day Response.

(c) All parts, labor, preventative maintenance and mileage.

(d) All chemicals, such as toner, fixing agent, and the like.

(e) System training and setup.

(10) Portable Toilets: Two (2); each shall include a urinal; each unit shall be a properly enclosed chemical unit conforming to ANSI Z4.3.

(a) Location: As directed by District.

(b) Maintenance: Maintain each unit and surrounding areas in a clean, hygienic and orderly manner, at all time. Empty, clean, and sanitize each unit each day at a location and time as directed by District.

(c) Removal: Relocate, or remove from the site, each Portable Toilet. Upon such directive by District, the Contractor shall forthwith relocate or remove each Portable Toilet and submit the affected areas to a condition which existed prior to the installation of each Portable Toilet, within three (3) calendar days, or as directed by District in writing, at no cost to District.

2.03 UTILITY AND SERVICES

A. Telephone Service: Contractor shall provide and interface the entire telephone service, and shall properly and timely pay for telephone service for District's non-long-distance use.

B. Electrical Service: Provide all proper connections and continuously pay for service for the duration of the Work.

2.04 FINISHES

A. General: Manufacturer standard finish system over surfaces properly cleaned, pretreated, and prepared to obtain proper bond; all visible surfaces shall be coated.

B. Finish: Color as selected by District from manufacturer standard palette.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General: Properly prepare area and affected items to receive the Work. Set Work accurately in location, alignment, and elevation; rigidly, securely, and firmly anchor to appropriate structure; install plumb, straight, square, level, true, without racking, rigidly anchored to proper solid blocking, substrate, and the like; provide appropriate type and quantity of reinforcements, fasteners, adhesives, self-adhesive and other tapes; lubricants, coatings, accessories, and the like, as required for a complete, structurally rigid, stable, sound, and appropriately finished installation, in accordance with manufacturer's published instructions, and as indicated. The more restrictive and higher quality requirement shall govern. Moving parts shall be properly secured, without binding, looseness, noise, and the like.

B. Installation: Install in accordance with 25 CCR 3.2.3 and as directed by District; jack up trailer and level both ways; mount on proper concrete piers with all load off wheels; provide required tie down and accessories per Section 4368 of referenced CCR, and as directed by District.

C. Rejected Work: Work, materials, unit, items, systems, and the like, not accepted by District shall be deemed rejected, and shall forthwith be removed and replaced with proper and new Work, materials, unit, items, systems, and the like at no cost to District.

D. Standard: Comply with manufacturer's published instructions, or with instructions as shown or indicated; the more restrictive and higher quality requirement shall govern.

E. Location: As directed by District.

F. Fire Resistance: Construct and install in accordance with UL requirements.

G. Maintenance: Contractor shall maintain trailer and adjacent areas in a safe, clean and hygienic condition throughout the duration of the Work, and as directed by District. Properly repair or replace furniture or other items, as directed by District. Properly remove unsafe, damaged, or broken furniture, or similar items, and replace with safe and proper items. Contractor shall pay cost of all services, repair, and maintenance, or replacement of each item.

H. Janitorial Service: Provide professional janitorial services, including, but not limited to, trash, waste paper baskets, fill paper dispensers; clean and dust all furniture, files, and the like; sweep and mop resilient and similar flooring; and vacuum carpeting and similar flooring.

(1) Frequency: Two (2) times per week, minimum.

I. Removal: Properly remove the Office Trailer and contents from the Site upon completion of the Contract, or as directed by District in writing. Forthwith properly patch and repair affected areas; replace damaged items with new items. Carefully and properly inventory, clean, pack, store, and protect District property; submit District property to District at a date, time and location as directed by District.

END OF DOCUMENT

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. General: Provide all materials, equipment and labor necessary to furnish and install straw wattles at locations shown on the Erosion Control Plan.

B. Erosion Control Plan: Contractor will be required to provide Best Management Practice (BMP) measures as shown on the Erosion Control Plan. The measures shown on the plan are the minimum measures required and shall be adjusted as necessary to protect the site. The Contractor shall as a minimum address:

1. Cut and fill operations.
2. Temporary stockpiles.
3. Vehicle and equipment storage, maintenance and fueling operations.
4. Concrete, plaster, mortar and paint disposal.
5. Dust control.
6. Tracking of dirt, mud on off-site streets.
7. Erosion Controls
8. Sediment Controls

1.02 QUALITY ASSURANCE

. General: Comply with local codes and regulations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Straw Wattles: Shall be new manufactured straw roles in compliance with state requirements for sediment control.

A. Hydroseed: Shall be a 3 step seeding rate consisting of:

Step 1:
Fiber Mulch @ 500 lbs/ac
Fertilizer (16-20-0) @ 250lbs/ac
Tacikfier (Plantago) @ 50lbs/ac
Seed (Blandon Brome) @ 12lbs/ac
Seed (Annual Rye) @ 9lbs/ac

Step 2:
Blown Straw @ 3500lbs/ac

Step 3:
Fiber Mulch @ 500lbs/ac
Tacikfier (Plantago) @ 200lbs/ac

PART 3 - EXECUTION

3.01 INSTALLATION

A. All BMPS shall be installed per the drawings and CASQA standards.

3.02 MAINTENANCE AND REMOVAL:

A. General: Maintain and repair existing and new erosion control facilities throughout the construction period. Remove silt build up at straw wattles and/or silt fences as needed. Repair damage to earth slopes and banks. Erosion control measures shall be left in place until hydroseed is placed.

B. Cleaning: Keep area clean of debris.

C. Remove all sediment control measures following site stabilization.

END OF SECTION

DOCUMENT 01 64 00

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Materials and Equipment.

1.02 SECTION INCLUDES

A. Requirements for the following:

(1) Installing Owner-furnished materials and equipment.

(2) Providing necessary utilities, connections and rough-ins.

1.03 DEFINITIONS

A. Owner: District, who is providing/furnishing materials and equipment.

B. Installing Contactor: Contractor, who is installing the materials and equipment furnished by the Owner.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Receive, store and handle products in accordance with the manufacturer's instructions.

B. Protect equipment items as required to prevent damage during storage and construction.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Installing Contractor's Responsibilities:

(1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.

(2) Provide mounting and utility rough in for all items where required.

(a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.

B. Owner and Installing Contractor(s) Responsibilities:

(1) Owner-Furnished/Contractor Installed ("OFCI"): Furnished by the Owner; installed by the Installing Contractor.

(a) General: Owner and Installing Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.

(b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04[A1].

(c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installing Contractor.

(d) The Installing Contractor shall:

1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.

2) Coordinate timely delivery. Installing Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installing Contractor shall assume responsibility for such defects and omissions.

3) Store materials and equipment until ready for installation and protect from loss and damage. Installing Contractor is responsible for providing adequate storage space.

4) Coordinate with other bid package contractors and field measurement to ensure complete installation.

5) Uncrate, assemble, and set in place.

6) Provide adequate supports.

7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and

Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.

8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.

9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.

10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:

(1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.

(2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.

D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

2.02 FURNISHED MATERIALS AND EQUIPMENT

A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install equipment items in accordance with the manufacturer's instructions.

B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.

C. Make electrical and mechanical connections as indicated and required.

D. Touch-up and restore damaged or defaced finishes to the Owner's satisfaction.

3.02 CLEANING AND PROTECTION

A. Repair or replace items not acceptable to the Architect or Owner.

B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the Owner.

END OF DOCUMENT

SECTION 01 66 00

PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;

B. Special Conditions.

1.02 PRODUCTS

A. Products are as defined in the General Conditions.

B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.

C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.

B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.

C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.

C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.

D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.

E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.

F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;

B. Special Conditions;

C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:

(1) Survey work required in execution of the Project.

(2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.

B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:

(1) Make no changes or relocation without prior written notice to District and Architect.

(2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

(3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.

B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.

C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 COMPLIANCE WITH LAWS:

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK:

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

DOCUMENT 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;

B. Special Conditions;

C. Hazardous Materials Procedures and Requirements;

D. Hazardous Materials Certification;

E. Lead-Based Paint Certification;

F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:

(1) Make several parts fit together properly.

(2) Uncover portions of Work to provide for installation of ill-timed Work.

(3) Remove and replace defective Work.

(4) Remove and replace Work not conforming to requirements of Contract Documents.

(5) Remove Samples of installed Work as specified for testing.

(6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

(7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.

B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:

(1) The work of the District or other trades.

(2) Structural value or integrity of any element of Project.

(3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.

(4) Efficiency, operational life, maintenance or safety of operational elements.

(5) Visual qualities of sight-exposed elements.

B. Contractor's Request shall also include:

(1) Identification of Project.

(2) Description of affected Work.

(3) Necessity for cutting, alteration, or excavations.

(4) Effects of Work on District, other trades, or structural or weatherproof integrity of Project.

(5) Description of proposed Work:

(a) Scope of cutting, patching, alteration, or excavation.

(b) Trades that will execute Work.

(c) Products proposed to be used.

(d) Extent of refinishing to be done.

(6) Alternates to cutting and patching.

(7) Cost proposal, when applicable.

(8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.

(9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE:

A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.

B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.

B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.

B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.

B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.

B. Contractor shall provide devices and methods to protect other portions of Project from damage.

C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

A. With respect to performance, Contractor shall:

(1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.

(2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.

(3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.

B. Contractor shall employ original installer or fabricator to perform cutting and patching for:

(1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.

(2) Sight-exposed finished surfaces.

C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.

E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with

requirements of the Contract Documents and as required to match surrounding areas and surfaces.

F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT

DOCUMENT 01 76 00

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;

B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.

B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.

B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION:

A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.

B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.

D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.

E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.

B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.

C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.

D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.

E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.

B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.

D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES:

A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.

B. Contractor shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:

A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.

B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.

C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.

B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING:

A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

DOCUMENT 01 77 00

CONTRACT CLOSEOUT AND FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Completion of Work;

B. Special Conditions;

C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

A. Contractor shall execute final cleaning prior to final inspection.

B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.

C. Contractor shall clean equipment and fixtures to a sanitary condition.

D. Contractor shall replace filters of operating equipment.

E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.

F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.

G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

A. Contractor shall legibly mark each item to record actual construction, including:

(1) Measured depths of foundation in relation to finish floor datum.

(2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.

(3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

(4) Field changes of dimension and detail.

(5) Details not on original Contract Drawings

(6) Changes made by modification(s).

(7) References to related Shop Drawings and modifications.

B. Contractor will provide one set of Record Drawings to District.

C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.

C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.

E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.

B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Completion of the Work;

B. Special Conditions.

1.02 QUALITY ASSURANCE:

Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT:

A. Contractor shall prepare data in the form of an instructional manual entitled "OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS" ("Manual").

B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.

C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.

D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.

E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME:

A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants, Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.

C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.

E. Text: Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Warranties and Bonds: Contractor shall bind in one copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES:

A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Contractor shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.

E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:

A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.

B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.

C. Contractor shall include color coded wiring diagrams as installed.

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

E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.

G. Contractor shall include manufacturer's printed operation and maintenance instructions.

H. Contractor shall include sequence of operation by controls manufacturer.

I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Contractor shall provide control diagrams by controls manufacturer as installed.

K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.

L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).

O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 SUBMITTAL:

A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor’s start of Work.

B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.

C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.

D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Warranty/Guarantee Information;

B. Special Conditions.

1.02 FORMAT

A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.

B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.

C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.

D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.03 PREPARATION:

A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty blank until the date of completion is determined.

B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.

C. Contractor shall co-execute submittals when required.

D. Contractor shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS:

A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.

B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.

C. For items of work delayed beyond date of completion, Contractor shall provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as start of warranty period.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 39

RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Documents on Work;

B. Special Conditions.

PART 2 - RECORD DRAWINGS

2.01 GENERAL:

A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible, full size original Contract Drawings (mylars).

B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible vellums of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible vellums at the conclusion of the Project following review of the blueline prints.

C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.

D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.

E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

2.02 RECORD DRAWING INFORMATION:

A. Contractor shall record the following information:

(1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.

(2) Actual numbering of each electrical circuit to match panel schedule.

(3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.

(4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.

(5) Installed location of all cathodic protection anodes.

(6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.

(7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.

(8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

B. Contractor shall provide additional drawings as necessary for clarification.

C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."

D. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide electronic copies of the drawings (in PDF format) with one file with all of the sheets and one set of individual sheet files at the conclusion of the Project.

PART 3 - RECORD SPECIFICATIONS

3.01 GENERAL:

A. Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.

B. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide one electronic copy of the specifications (in PDF format) at the conclusion of the Project.

PART 4 - MAINTENANCE OF RECORD DOCUMENTS

4.01 GENERAL

A. Contractor shall store Record Documents apart from documents used for construction as follows:

(1) Provide files and racks for storage of Record Documents.

(2) Maintain Record Documents in a clean, dry, legible condition and in good order.

B. Contractor shall not use Record Documents for construction purposes.

PART 5 – PRODUCTS Not Used.

END OF DOCUMENT

PART 1 – GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 01 57 13, Erosion Control

C. Section 31 00 00, Earthwork.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable jurisdictional authority regulations and codes for disposal of debris.
B. Coordinate clearing Work with utility companies.
C. Maintain emergency access ways at all times.
D. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.04 SUBMITTALS:

A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.

B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

1.05 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

1.06 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Safety Precautions Prevent damage to existing elements identified to remain or to be salvaged, and prevent injury to the public and workmen engaged on site. Demolish roofs, walls and other building elements in such manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate on site. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends.

1. Protect existing items which are not indicated to be altered. Protect utilities designated to remain from damage.
2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on drawings.
3. Protect bench marks from damage or displacement.

D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

E. Fire Safety: The contractor shall conform to chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition", at all times during the construction process. A copy of this chapter can be provided.

F. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

G. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

H. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine conditions of work in place before beginning work; report defects.

B. Report existence of hazardous materials or unsafe structural conditions.

3.02 PREPARATION

A. Scheduling:

1. General: Coordinate and schedule demolition work as required by the Owner and as necessary to facilitate construction progress.

B. Hazardous Materials:

1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact the Owner. Do not proceed with demolition until directed by Owner.

C. Utility and Service Termination

1. Locate and identify existing utility, service and irrigation system components affected by work of this contract. Review existing record drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
2. Prior to beginning any demolition, properly disconnect all water, gas and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
3. Prior to demolition or disconnect, obtain Owners approval that such system does not impact facilities or systems beyond the extent of this contract.
4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project Record Documents.

D. Verify that existing plant life and features designated to remain are tagged or identified.

1. The Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by the Owner and all protective measures are in place.

E. Coordinate the time and duration of all system disconnects with Owner.

3.03 DEMOLITION

A. General Requirements

1. Clear areas required for access to site and execution of Work, including pavements, structures, foundations, vegetation, trash and debris.
2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.

B. Fixture and Equipment Removal:

1. Remove existing fixtures and equipment as identified and shown on drawings and required by Architect.
2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
3. Remove all conductors from conduit at all abandoned circuits.

3.04 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts and similar components.

1. Review all contract documents showing crossing paths and potential points of interference.
2. Pot-hole or determine by other means the accurate depth and location of such utilities.
3. Incorporate all costs required to complete work under this contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this contract.
4. No additional cost to the Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on contract drawings or can be reasonably inferred from surface conditions or components.

B. Remove all conductors from conduit at all abandoned electrical circuits.

C. Seal off ends of all piping, drains and other components as directed by Architect and serving utility.

D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components.

1. Re-circuit all electrical as required.
2. Re-circuit all landscape irrigation valving and control systems as required.

3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.
4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets and piping. Fine grade to maintain proper drainage flow pattern to drains.

E. Demolish structure in an orderly and careful manner.

1. Use of explosives prohibited.

3.05 SITE PAVEMENT REMOVAL

A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove concrete paving and curbing at locations shown on drawings. Locate closest adjacent expansion or weakened plane joint to define start of removal or saw-cutting.

B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove paving assembly as required to expose subgrade.

3.06 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

A. Clearing, grubbing, and planting demolition.

1. Remove grass and grass roots to a minimum depth of two inches below existing grade.
2. Remove all shrubs, plants and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
3. Remove only those trees which are specifically designated for removal, or as shown on the drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than 1 inch in diameter to a depth of two feet below existing or finished grades, whichever is lower and a minimum of five feet beyond the edge of paving, structure, wall or walkway.
4. Hand cut existing tree roots over 1 inch in diameter as necessary for trenching or other new construction, apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 310000.

8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
9. Keep drains, catch basins, surface drainage courses and related drainage system components clear of debris and construction materials.
10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.07 DISPOSAL

Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.

A. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.

B. It is recommended that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same).

C. Burning and Burying of Materials: NOT ALLOWED.

D. Haul Routes:

1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.
2. Keep streets free of mud, rubbish, etc.; assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.

E. Remove demolished materials and debris from site on a daily basis.

3.08 CLEANING

A. Upon completion of work of this Section promptly remove from the working area all scraps, debris.

B. Clean excess material from surface of all remaining paved surfaces and utility structures.

C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions and Division I General Requirements shall be included in and made part of this Section.

B. Examine all project drawings and documents including other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.2 COMPLIANCE AND INTENT

A. The Contractor is responsible for repair, to the satisfaction of the Lodi Unified School District (District), of surfaces not scheduled for abatement or demolition that become damaged as a result of the work.

B. Contractor shall coordinate removal with all site requirements related to protection of existing site buildings and utilities. Water and encapsulants used during abatement work must not migrate beyond established regulated work area barriers. Additional precautions must be followed when working adjacent to existing structures.

C. This project deals with abatement of asbestos-containing materials (ACMs) and materials with asbestos content and renovation work that will likely impact ACMs associated with the Lodi Middle School – Building F Student Restrooms and the surrounding hardscape. It is necessary for the Contractor to coordinate all abatement work with the project drawings and specifications. During all work, provide monitoring and worker protective equipment in accordance with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this specification. Where there is conflict, the most stringent requirement shall apply.

D. The work covered by this specification includes the handling, removal, and proper disposal of ACMs and materials with asbestos content. All hazardous materials shall be removed and disposed of according to all federal, state, and local regulations. The Contractor shall determine if additional hazardous materials will be impacted by the scope of the abatement work. The cleanup of any incidental asbestos found in areas undergoing abatement of asbestos that become separated from the building during the dismantling process are part of the work.

E. The abatement workers shall have received Cal-OSHA and Asbestos Hazard Emergency Response Act (AHERA) accredited training and be certified for asbestos abatement work.

F. Any work that is likely to disturb ACMs remaining in the building must be completed by workers trained at a minimum for Class II Asbestos Work.

G. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits, and agreements necessary to perform the work required for asbestos abatement in accordance with this specification.

H. Comply with all federal, state, and local regulations pertaining to asbestos removal, storage, transportation, and disposal; employee health and safety; Contractor certifications; and all licenses, permits, and training.

I. Work on the premises shall be confined to areas designated in the Project Documents. Materials and equipment shall be stored within areas designated by the Owner. Should additional space be required, the Contractor shall request permission for additional space.

J. Perform all work specified herein with competent persons trained, knowledgeable, and qualified in state-of-the-art techniques relating to asbestos abatement, handling, and the subsequent cleaning of contaminated areas.

K. During removal activities, the Contractor shall protect against contamination of soil, water, plant life, sensitive building finishes, and adjacent building areas. Contractor shall ensure that there is no airborne release of asbestos fibers or visible dusts. The Owner may collect air samples in the buildings and in adjacent areas to evaluate the Contractor's performance. Evidence of airborne levels of contaminants above background levels will require the implementation of additional controls.

L. It is the Contractor's responsibility to determine the quantities of ACMs that will require removal prior to commencement of the project. The Contractor shall conduct a site visit to determine exact locations of materials that will require abatement. This section provides appropriate protocols for handling and disposal of ACMs and materials with asbestos content. All ACMs shall be removed according to the requirements outlined in this specification. If additional suspect ACMs are discovered during the abatement work, immediately notify the Owner and the consultant.

M. The work of this section shall be performed by an entity that holds a current, valid C-22 license issued by the California Contractor's State License Board (CSLB) and a current valid Certificate of Registration for Asbestos-Related Work issued by the California Department of Industrial Relations-Division of Occupational Safety and Health (Cal-OSHA), unless other specified. Display copies of CSLB license and Cal-OSHA Registration in a visible place at the jobsite.

N. ACMs and materials with asbestos content removed during the abatement activities shall be disposed of in an approved manner complying with all applicable federal, state, and local regulations. Appropriate waste manifests or letters of salvage shall be furnished to the Owner thereby limiting the Owner's liability for improperly salvaged items. Materials are conveyed to the Contractor "as is," without any warranty, expressed or implied, including but not limited to, any warranty to marketability or fitness for a particular purpose, or any purpose. The Owner or the Owner's Environmental Consultant shall approve the use of any hazardous waste disposal site(s) prior to disposal for materials that may be disposed of in that manner.

O. All interior asbestos abatement work shall be conducted using a negative pressure enclosure and three stage decontamination unit unless otherwise specified. The removal of any exterior ACMs by mechanical methods or aggressive methods that render a material friable must be removed in a negative-pressure enclosure. Evidence of the release of asbestos above the background level will necessitate additional controls including but not limited to an enclosure.

1.3 DEFINITIONS

A. The following definitions pertain to work of this section.

1. Abatement: Process of controlling fiber release from ACMs including encapsulation, enclosure, controlled renovation procedures, removal, clean-up, and disposal.

2. ACCM: Asbestos-containing construction material, a manufactured material which contains greater than 0.1% asbestos by weight.

3. ACM: Asbestos containing material, any material or product which contains more than 1% asbestos by weight.

4. Aggressive Sampling: Air sampling either during or following the agitation of the air.

5. AHERA: Asbestos Hazard Emergency Response Act (40 CFR Part 763).

6. Airlock: A system for permitting ingress and egress with minimum air movement between a contaminated area and uncontaminated areas. Typically consists of two curtained or gasketed doorways separated by a distance of at least six feet such that one passes through one doorway into the airlock, allowing the doorway to close off the opening. This airlock must be maintained in an uncontaminated condition at all times.

7. Ambient Air Quality: The quality of air (in terms of airborne fiber content) that is present in a given space.

8. Area Monitoring: Sampling of airborne asbestos fiber concentrations within the work area and outside the work area. Sampling shall represent airborne concentrations that may reach the breathing zone.

9. Asbestos Fibers: Refers to asbestos fibers having an aspect ratio of 3:1, and those fibers longer than five (5) microns.

10. Asbestos Permissible Exposure Limit (PEL): A level of airborne fibers specified by OSHA as an occupational exposure standard for asbestos. This level represents the 8-hour time-weighted average of 0.1 fibers per cubic centimeter of air as measured by Phase Contrast Microscopy (PCM) analytical method.

11. Asbestos-Containing Material (ACM): Those manufactured products and construction materials including structural and mechanical building materials, as well as packings and gaskets that contain more than one percent (1.0%) asbestos by weight.

12. Asbestos: Asbestos includes asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-gunerite (amosite), anthophyllite, tremolite, and actinolite. For the purposes of determining worker respiratory protection, both the asbestiform and non-asbestiform of the above minerals, and any chemically treated or altered materials shall be considered as asbestos.

13. Authorized Visitor: Designated employees or consultants for the Owner and representatives of any federal, state, or local regulatory or other agency having jurisdiction over the project.

14. Baseline: Refers to the background levels of asbestos monitored before abatement.

15. Breathing Zone: A hemisphere forward of the shoulders and head with a radius of approximately six to nine inches.

16. Breach: A rift or gap in the critical or secondary barriers that allow egress of air from the containment to outside, or vice versa.

17. Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in-situ asbestos matrix.

18. Cal-OSHA: State of California, Department of Occupational Safety and Health (DOSH).
19. Chain-of-Custody: A legal concept involving documentation of the physical possession of a sample(s) from the moment it is collected, transported, analyzed, and ultimately stored in an archive.

20. Change Rooms: Refers to the two chambers in the decontamination area used to change into and out of protective clothing.

21. Certified Industrial Hygienist (CIH): A person certified by the American Board of Industrial Hygiene.

22. Clean Room: An uncontaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.

23. Clearance Level: Clearance level for samples analyzed by PCM will be less than 0.01 fibers per cubic centimeter of air and for TEM will be less than 70 structures per square millimeter (<70 s/mm2). Samples will be collected by aggressive sampling methods. A minimum air volume of 1,200 liters shall be collected for TEM air samples and 3,850 liters for PCM air samples.

24. Competent Person: One who is capable of identifying existing and predictable hazards and who has the authority to take prompt corrective measures to eliminate them.

25. Critical Barrier: A unit of temporary construction that provides the only separation between asbestos work area and an adjacent potential occupied space. This includes the decontamination unit, perimeter walls, ceilings, penetrations and any temporary critical barriers between the work area and the uncontaminated environment.

26. CSLB: Contractors State Licensing Board

27. Decontamination Area: Area which is constructed to provide the means for workers to store clothing, equipment, and other articles, and to properly remove contamination upon concluding work activities that result in exposure to these hazardous materials.

28. DOP: Dioctylphthalate or DOP-equivalent, the challenge aerosol used to perform on-site leak testing of HEPA filtration equipment.

29. DOT: Federal Department of Transportation.

30. DOSH: Division of Occupational Safety & Health (see also Cal-OSHA)

31. Decontamination Unit: Refers to system of airlocks used to decontaminate personnel, waste bags, equipment, etc. when exiting the work area. A decontamination unit shall be set up for each containment area.

32. Demolition: The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

33. Disposal Bag: Minimum six (6) mil thick leak-tight plastic bags used for transporting asbestos waste from a work area to disposal or shipping container. Each disposal bag must have required labels according to Title 8 CCR 1529 (Cal-OSHA asbestos rule), 5194 (HAZCOM). RACM waste must be additionally labeled according to 49 CFR 171-179 (USDOT), and 40 CFR 61 Subpart M (NESHAP). Hazardous waste disposal bags must be labeled with generator's name, address, site location, generator number, and the following information:

CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST
RQ WASTE ASBESTOS, 9 NA 2212 PG III
(Class 9 placard)
HAZARDOUS WASTE
STATE AND FEDERAL LAW
PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST
POLICE OR PUBLIC SAFETY
AUTHORITY OR THE CALIFORNIA
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

34. District/Owner: Lodi Unified School District.

35. Encapsulant: A liquid material that can be applied to ACMs that controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging) or by penetrating the material and binding its components together (penetrating encapsulant).

36. Encapsulation: A specified procedure necessary to coat ACMs or asbestos contaminated surfaces with an encapsulant to control the possible release of asbestos fibers into the ambient air.

37. Enclosure: The construction of an airtight, impermeable, permanent barrier surrounding the ACM to prevent the release of asbestos fibers into the air.

38. Environmental Consultant: Certified Asbestos Consultant (CAC), and/or Certified Site Surveillance Technician (CSST) retained by the Owner.

39. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically in a designated area of the work area, and including a washroom, a holding area, and an uncontaminated area.

40. Equipment Room: A contaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment. The equipment room shall be kept clean from asbestos-containing debris at all times.

41. Excursion Limit: A California Code of Regulations (Title 8 CCR 1529) requirement that ensures no employee exposed to airborne concentrations of asbestos in excess of 1.0 fibers per cubic centimeter of air as averaged over a sampling period of thirty (30) minutes.

42. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.

43. Fixed Object: A unit of equipment or furniture in the work area that cannot be removed from the work area.

44. Friable Asbestos-Containing Material: Material that contains more than 1.0% asbestos by weight, and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

45. Foreman: An individual who typically fulfills the duties of “competent person” as defined by Title 8 CCR 1529. This individual must supply documentation of a passing grade in a Cal-OSHA accredited course in Asbestos Contractor/Supervisor training. The foreman must be on-site during all abatement work.

46. Glove Bag: A polyethylene bag with two inward projecting long sleeve gloves, designed to enclose an object from which an ACM is to be removed. Bags shall be seamless at the bottom, have a minimum thickness of 6 mil, and shall be labeled appropriately.

47. Glove Bag Technique: A method for removing ACM from heating, ventilation, and air conditioning (HVAC) associated piping runs, valves, joints, elbows, and other non-planar surfaces. The glove bag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all asbestos fibers released during the process. Secondary containment shall be provided for all glove bag work unless otherwise noted.

48. Gross or Full Abatement: Designated rooms, spaces, or areas of the project that have been totally sealed, contained in polyethylene, equipped with decontamination enclosure systems, and placed under negative pressure.

49. HEPA: High Efficiency Particulate Air filter capable of filtering out airborne particulate 0.3 microns or greater in diameter at 99.97 percent efficiency.

50. Manifest: The document authorized by both Federal and State authorities for tracking the movement of ACMs.

51. Movable Object: A unit of equipment or furniture in the work area that can be removed from the work area.

52. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere, and negative during inhalation in relation to the air pressure of the outside atmosphere.

53. Negative Pressure: Air pressure lower than surrounding areas, generally caused by exhausting air from a sealed space (work area).
54. NESHAP: National Emission Standard for Hazardous Air Pollutants – EPA Regulation 40 CFR Subpart M, Part 61.

55. NIOSH: National Institute for Occupational Safety and Health: Sets test standards, analytical methods, and certifies performance of various respirator designs (research institute within Federal OSHA).

56. NIST: National Institute of Standards and Technology: Administers the NVLAP Program.

57. NOA – Naturally Occurring Asbestos.

58. NVLAP: National Voluntary Laboratory Accreditation Program – evaluates and certifies laboratories doing PLM and TEM analyses.

59. Passive Sampling: Refers to air sampling with no air agitation.

60. Permissible Exposure Limits (PEL): A level of airborne fibers specified by OSHA as an occupational exposure standard for asbestos. This level represents the 8-hour time-weighted average of 0.1 fibers per cubic centimeter of air and 30-minute excursion limit of 1.0 fibers per cubic centimeter of air as measured by Phase Contrast Microscopy (PCM) analytical method.

61. Phase Contrast Microscopy (PCM): Technique using a light microscope equipped to provide enhanced contrast between the fibers and the background. Filters are cleared with a chemical solution and viewed through the microscope at a magnification of approximately 400X. This method does not distinguish between fiber types and only counts those fibers longer than 5 microns and wider than approximately 0.25 microns. Because of these limitations, fiber counts by PCM typically provide only an index of the total concentration of airborne asbestos in the environment monitored.

62. Polarized Light Microscopy (PLM): An optical microscope technique used to identify asbestos content and distinguish between different types of asbestos fibers by their shape and unique optical properties.

63. Powered Air Purifying Respirator (PAPR): A full facepiece respirator that has the breathing air powered to the wearer after it has been purified through a filter.

64. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

65. Remodel: Replacement or improvement of an existing building or portion thereof where exposure to airborne asbestos may result. Remodel includes, but is not limited to, installation of materials, demolition, cutting, patching, and removal of building materials.

66. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

67. Shower Room: A room between the clean room and the equipment room in the work decontamination enclosure system. This room contains hot and cold or warm running water and soap suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.

68. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

69. Transmission Electron Microscopy (TEM): Asbestos structure analysis for a specified volume of air. TEM is a technique that focuses an electron beam onto a thin sample. As the beams transmits through certain areas of the sample, an image resulting from varying densities of the sample is projected onto a fluorescent screen. TEM is the state-of-the-art analytical method for identifying asbestos fibers collected in air samples in non-industrial settings. TEM microscopes equipped with selected area electron diffraction (SAED) capabilities also can provide information on the crystal structure of an individual particle.

70. TSI – Thermal Systems Insulation

71. Visible Emissions: Any emission containing particulate material that is visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

72. Visual Inspection: A visual inspection by Environmental Consultant, of the work area under adequate lighting to ensure that the work area is free of visible PCB material, debris, and dust.

73. Washroom: A room between the work area and the holding area in the equipment decontamination enclosure system equipped with water for decontamination of equipment and sealed waste containers. The washroom or shower room comprises one airlock.

74. Water Filtration: Refers to water filtration to as small a particulate size as technically feasible, but not more than 5 microns.

75. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, HEPA vacuuming, or other cleaning utensils dampened with amended water and afterward thoroughly decontaminated or disposed of as asbestos contaminated waste.

76. Work Area: The area where asbestos removal is performed and that is defined or isolated to prevent the spread of asbestos fibers, dust or debris, and entry by unauthorized personnel. Work area is a regulated area as defined by Title 8 CCR 1529.

1.4 SCOPE OF WORK

A. Provide the removal of ACMs and materials with asbestos content and construction work that will likely impact known and assumed ACMs as specified in this section. Reference all other sections of the Specifications and other sections included in the contract documents for information and requirements that affect the work of this Section. The work shall include but not be limited to the following:

1. Modernization of Restrooms at Building F.
2. Removal and replacement of walkways around classrooms as indicated on provided plans.
3. Undercutting of doors and installation of new door bottoms and thresholds.
4. Sealing of the brick veneer finish at all building exteriors.

B. Table I attached provides estimated quantities of known and assumed ACMs and ACCMs that will be impacted or removed by the scheduled work. The Contractor is responsible for field verifying quantities of ACMs/ACCMs and difficulty in abating the same.

C. The following material can be disposed of as Category II Non-friable ACM if it is not rendered friable during removal: exterior sealant.

D. The following materials point counted and verified to contain <1.0% asbestos can be disposed of as construction debris: Drywall and joint compound composite systems debris.

E. Note some asbestos containing materials are associated with lead containing materials and/or paint. Coordinate removal and disposal with Section 02 83 00 – Lead-Containing Paint Removal and Lead-Related Construction.

F. All workers that contact ACM shall be trained at minimum in accordance with Title 8 CCR 1529 for Class IV Work. Workers that will perform work that may disturb remaining ACMs shall be trained in accordance with Title 8 CCR 1529 for Class III Work. Construction work that will create debris (disturbance) during removal of architectural components, attachments to existing finishes, and wall preparation where ACMs are present is considered Class III work.

G. Construction work that involves disturbances of existing ACMs not scheduled for removal including but not limited to wall or flooring materials must coordinate work with the abatement contractor or complete work with Class III trained workers and procedures, as appropriate.

1.5 REFERENCES

The publications listed below form a part of this specification by reference. The publications are referred to in the text by basic designation only. If there is a conflict between any of the listed regulations or standards, then the most stringent or restrictive shall apply.

A. American National Standards Institute (ANSI) and American Society for Testing and Materials (ASTM)
   1. ANSI Z9.2, 1979 (R 1991), Fundamentals Governing the Design and Operation of Local Exhaust Systems
   2. ANSI Z87.1, 2003, Occupational and Educational Eye and Face Protection
   3. ANSI Z88.2 1992, Respiratory Protection
   4. ANSI Z89.1, 1986, Requirements for Protective Headgear for Industrial Workers
   5. ANSI Z41, 1999, Personal Protection – Protective Footwear
   6. ANSI Z88.6, 1984, Respiratory Protection – Respiratory Use Physical Qualifications for Personnel
   7. ASTM C 732, 1982 (R 1987) Aging Effects of Artificial Weathering on Latex Sealants
   8. ASTM D 522, 1993 (Rev. A) Mandrel Bend Test of Attached Organic Coatings
   9. ASTM D 1331, Solutions of Surface-Active Agents
   10. ASTM D 2794, 1993 Resistance of Coatings to the Effects of Rapid Deformation (Impact)
   11. ASTM E 84, 1991 (Rev. A) Surface Burning Characteristics of Building Materials
   12. ASTM E 96, 1994 Water Vapor Transmission of Materials
   13. ASTM E 119, 1988 Fire Tests of Building Construction and Materials
   14. ASTM E 736, 1992 Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
   15. ASTM E849, 1986 Safety and Health Requirement Relating to Occupational Exposure to Asbestos
   16. ASTM E 1368, 1990 Visual Inspection of Asbestos Abatement Projects
   17. ASTM E1494, 1992 Specifications for Encapsulants for Friable Asbestos-Containing Building Materials

B. California Assembly Bills (CAB)
   1. CAB 040, Yearly Registration of Contractors

C. California Code of Regulations (CCR)
   1. Title 8 CCR 5208, General Industry - Asbestos
   2. CCR CARS, Carcinogen and Asbestos Registration Sections 340-344.53, 341.6 Amended, and 341.9 Amended Through 341.14
   3. CCR ESO, Electrical Safety Orders, Chapter 4, Subchapter 5
   4. CCR 1523, Illumination
   5. CCR 1529, Asbestos in the Construction Industry
   6. CCR 1531, Construction Respiratory Protective Equipment
   7. CCR 3203, Injury and Illness Prevention Program
   8. CCR 3204, Access to Employee Exposure and Medical Records
   9. CCR 3220, Emergency Action Plan
   10. CCR 3221, Fire Prevention Plan
   11. CCR 5144, Respiratory Protection Equipment Standard
   12. CCR 5194, Hazard Communication Standard
   13. CCR 6003, Accident Prevention Signs

14. Title 22, Division 4, Minimum Standards for Management of Hazardous and Extremely Hazardous Waste

D. California Health Services (CHS) Titles 22 and 23, California Administrative Code Disposal Requirements
   1. CHS 25123, Section 25123
   2. CHS 25124, Section 25124
   3. CHS 25143, Section 25143
   4. CHS 25163, Section 25163
   5. CHS 66508, Section 66508
   6. CHS 66510, Section 66510
   7. CHS DIV 4, Division 4, Commencing with Section 66000, "Disposal"

E. California Health and Safety Code (CHSC)
   1. Division 20, Commencing with Section 24200

F. California Labor Code (CLC)
   1. CLC DIVISION 5, Part 1, commencing with 6300

G. California Propositions (CP)
   1. CP 65, Proposition 65

H. California State Board of Equalization (CSBE)
   1. CSBE ETU, Excise Tax Unit

I. California State License Board (CSLB)
   1. CSLB CBPC, California Business and Professional Code Sections 7058.5 and 7058.7, "Certification"

J. Code of Federal Regulations (CFR)
   1. 29 CFR 1910.134, Respiratory Protection
   2. 29 CFR 1910.141, Sanitation
   3. 29 CFR 1910.145, Accident Prevention Signs and Tags
   4. 29 CFR 1926.21, Safety Training and Education
   5. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists
   6. 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response
   7. 29 CFR 1926.59, Hazard Communication
   8. 29CFR 1910.1000, Air Contaminants
   9. 29 CFR 1926.1101, Asbestos
   10. 40 CFR 61-SUBPART A, General Provisions
   11. 40 CFR 61-SUBPART M, National Emission Standard for Asbestos
   12. 40 CFR 260, Hazardous Waste Management Systems: General
   13. 40 CFR 745, Lead; Requirements for Lead-Based Paint Activities
   14. 40 CFR 763, Asbestos Containing Material in Schools

K. State and Local Regulations
   1. San Joaquin Valley Air Pollution Control District (SJVAPCD), Rule 4002

L. Underwriters Laboratories, Inc. (UL)
   1. UL 586-96, 1996 Test Performance of High-Efficiency Particulate Air Filter Units

1.6 SUBMITTALS PRIOR TO START OF WORK

A. The reviews by the District or District's designated representative are intended to be only for general conformance with the requirements. The District or District's designated representative assumes no responsibility for permits, licenses, notices, materials and methods, equipment or temporary construction required to execute the work described in this Section of the Specification or in other Sections of the Specification or in other documents included in the contract documents.

B. Before commencing work involving the abatement of asbestos, submit the following for review by the District or District's designated representative:

   1. Provide a detailed asbestos abatement work plan that is specific for each material and method of removal in each structure. See Attachment A for a Work Plan Outline.

   2. Provide an asbestos site safety plan prior to project initiation. The site safety plan shall deal with the following, at a minimum: site safety and health hazards; fiber release incidents; control of water leakage or discharge within and/or from the work area; medical emergency; asbestos handling procedures; fall protection; electrical safety; Contractor's internal administrative and inspection procedures; earthquakes and/or fire emergency procedures; protocol for responding to complaints or questions from interested parties; 24-hour emergency telephone numbers for individuals with authority to respond to emergencies.

   3. Competent Person (as defined by Title 8 CCR 1529): Demonstrate education and specialized training with successful completion of examination of a Cal-OSHA accredited asbestos training course.

   4. Workers: Demonstrate education and specialized training with successful completion of a Cal-OSHA accredited asbestos training course.

   5. Submit current certificates (less than 11 months) signed by each employee and trainer that the employee has received proper training in the handling of materials that contain asbestos. Include documentation showing that the worker understands the following: health implications and risks involved (including the illnesses possible from exposure to airborne asbestos fibers), the use and limits of the respiratory equipment to be used, and the results of monitoring of airborne quantities of asbestos concerning health and respiratory equipment.

   6. Proof of Respirator Fit Testing: Provide proof of respirator fit testing. Fit testing records must be less than eleven (11) months old and document testing on the type of respiratory protective equipment used for this project. Fit testing records must be signed by the Competent Person.

7. Foreman Training: Submit evidence that the foreman to be used on the job fulfills the qualifications detailed in this specification and has experience in similar jobs.

8. Medical Examinations: Submit evidence signed by a physician that each employee used on the job has received an appropriate medical examination as detailed in Title 8 CCR 1529. The submitted document must be less than eleven (11) months old.

9. Written Notification to Fire and Police Departments: Provide documentation showing notification to local fire and police departments of the abatement three (3) days before commencement.

10. Certificates of Compliance: Submit manufacturer's certification that vacuums, ventilation equipment, and other equipment required to contain airborne asbestos fibers conform to ANSI Z9.2. Submit results of onsite DOP-equivalent testing of all HEPA-filtered ventilation equipment.

11. Satisfactory proof that written notification and subsequent updates have been provided to the San Joaquin Valley Air Pollution Control District, in accordance with Rule 4002, Cal-OSHA, and Title 40 CFR Part 61 Subparts A&M, National Emission Standards for hazardous Air Pollutant, U.S. EPA as needed for any friable removal.

12. Licenses: Submit copies of state and local licenses, evidence of Cal-OSHA registration and permits necessary to carry out the work of this contract.

13. Notification of Other Contractors: If other contractors are working at the job site, before beginning any work the Contractor must inform all other contractors in writing regarding the location, nature, and requirements of the work areas.

14. Safety Data Sheets (SDSs)/Specification Sheets: The Contractor shall submit SDSs and Specification Sheets for all chemicals, encapsulants, etc. to be used for this project.

1.7 SUBMITTALS AT THE COMPLETION OF THE PROJECT

A. Upon completion of on-site work, the Contractor shall provide a detailed project summary that will include each of the items listed below. The project summary shall be submitted and approved by the District or District’s representative and shall include the following:

1. Copies of the Security and Safety Logs showing names of persons entering the workspace. The logs shall include date and time of entry and exit, supervisor's record of any accident (detailed description of accident).

2. Chain of custody documentation and laboratory reports for all analyses performed.

3. Emergency evacuations and any other safety or health incident.

4. Submit uniform hazardous and non-hazardous waste manifests prepared, signed, and dated by an agent of the landfill. The manifest must certify the quantity of hazardous materials delivered to the landfill. The manifest must be provided to the District or District's designated representative within ten working days after delivery.

5. Personal air sample results.

6. Pressure differential readings for each differential recording device on the site.

7. Project Summary:
   a. Abatement contractor's name and address, certification number (CSLB), registration number (DOSH), and Tax ID number.
   b. Hazardous waste hauler certifications (DHS, DOT).
   c. Name, address, and registration number of hazardous waste hauler.
   d. Laboratory performing analyses (NVLAP).
   e. Name of project and project reference number.
   f. Specific inventory (including locations and approximate quantities) of the hazardous materials which were removed or handled and ACMs that remain in each building.
   g. Number of employees working on the project.
   h. Dates of commencement and completion of on-site work.
   i. Work method(s) employed (i.e., glove bag, mini-containment, full containment with negative air and decontamination enclosure system, etc.)
   j. Name, location, telephone number, and EPA registration of waste disposal site(s) used.
   k. DOP-equivalent testing results.

1.8 CONTRACTOR MONITORING

A. The District or District's designated representative reserves the right to perform air sampling in selected areas during the project. District or District's designated representative reserves the right to stop work within an area if while performing monitoring, instances of substantial non-conformance with this Section or other Sections of the Specification presenting health hazards to workers, the public, or the surrounding areas are observed. Work shall not resume until the corrective measures have been enforced. Instances of substantial non-conformance shall include, but not be limited to, the following:

   1. Activities or misconduct imperiling worker's safety and health.

   2. Airborne fiber concentrations as measured by PCM outside of the containment area exceeding background levels or 0.01f/cc whichever is greater. Airborne concentrations as measured by TEM outside of the containment area exceeding background levels or 70 S/mm^2, whichever is greater.

   3. Loss of negative pressurization for more than two minutes.

   4. Breaches in containment resulting in potential release of asbestos to non-work areas.

B. The consultant shall perform visual inspections of each regulated area prior to abatement to verify proper containment and controls. A visual inspection(s) will be performed at the conclusion of the abatement to verify complete removal. The consultant will perform air sampling inside and outside the regulated work area during all phases of the work to verify air quality beyond the work area during abatement and air quality inside the work area following abatement.

C. The District or District's designated CAC may perform visual inspections and air testing as requested to verify performance.

PART 2 - PRODUCTS

2.1 SIGNS AND LABELS:

A. Provide labeling in accordance with state and federal EPA requirements. Provide the required signs, labels, warnings, placards, or posted instructions for containers used to transport hazardous material to the landfill.

B. Location of Caution Signs and Labels: Provide bilingual caution signs at all approaches to work areas in languages used by the Contractor's employees. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos-containing materials, scrap, waste, debris, and other products contaminated with hazardous materials.

C. Warning Sign Format: Vertical format conforming to Title 8 CCR 1529:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGED TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORS AND
PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

D. Warning Label Format: Provide labels that comply with Title 8 CCR 1529 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

2.2 ENCAPSULANTS

A. Encapsulants shall be UL Listed, in full-scale E-119 fire test.

B. Average depth of penetration shall meet manufacturer's recommendations.

C. Dry mil thickness of bridging encapsulating systems (if used) shall be as indicated in the specific treatment instructions included in this specification, and as recommended by the manufacturer.

D. Performance Requirements: Classification - penetrating encapsulant; spray applied and brushable. Product shall be tested and listed by EPA and possess the following characteristics:

1. Flame resistance/flame spread ~25 (ASTM E162) V6.

2. Fire classification - UL Class A approved in the specific or similar assembly to its intended application.

3. Product shall be tested and rated non-toxic and non-irritating under the Federal Hazardous Substances Control Act and contain no methylene chloride.

4. Material shall be tinted sufficiently to provide a readable contrast to background color to which it is applied.

2.3 PLASTIC SHEETING:

A. Use fire-retardant (FR) polyethylene film.

1. Thickness - 6-mil, minimum, NO EXCEPTIONS.

2. Flame Resistance/Flame Spread Rate <25.

3. Conforms to NFPA #701 and tested in accordance with ASTM E-84.

2.4 TAPE, ADHESIVE, SEALANTS:

A. Tape, 2” or wider, shall be capable of sealing joints of adjacent sheet of polyethylene and shall attach polyethylene sheet to finished or unfinished surfaces or similar materials. Tape shall be capable of adhering under dry and wet conditions, including use of amended water. Taping to critical or sensitive surfaces shall be completed using preservation sealing tape.

B. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

C. Fire resistant sealants shall be compatible with concrete, metals, wood, etc. Sealant shall prevent fire, smoke, water, and toxic fumes from penetrating. Sealant shall have a flame spread, smoke and fuel contribution of zero, and shall be ASTM and UL rated for 3 hours for standard method of fire test for fire stop systems.

2.5 DIFFERENTIAL PRESSURE RECORDER(S):

A. Where interior work areas are required, each shall have a minimum differential pressure of 0.025 inches of the water gauge at all times. Fluctuations below 0.025 inches of water column are unacceptable and may require temporary cessation of work until conditions are corrected.

B. Differential pressure recorder(s) shall be used to document the level of pressure difference between the containment space and all other spaces. Defective or non-operating instrumentation may require temporary cessation of work until instrumentation is repaired or replaced.

C. The differential pressure instrument will be checked a minimum of four times per day by a person familiar with the operation. Each check shall be documented with a time and date notation and the initials of the person performing the check. A copy of the differential pressure recordings shall be submitted daily to the consultant.

D. Differential air pressure systems shall be in accordance with Appendix J of EPA's "Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA 560/5-85-024. The Differential pressure system shall be continuously monitored by the Contractor using a recording instrument. The recording instrument shall be connected to an audible alarm that will activate at a pressure differential of -0.025 inches of the water gauge air pressure.

2.6 VACUUM EQUIPMENT:

A. All vacuum equipment used in the work area shall use HEPA filtration systems and be of the wet-dry type. The Contractor shall provide on-site independent DOP-equivalent testing to document the effectiveness of the vacuum units. The test results shall be signed by the individual performing the testing. Provide documentation to the District or District's designated representative within 5 days of DOP-equivalent testing.

2.7 LOCAL EXHAUST SYSTEM:

A. Where containments are required, sufficient High Efficiency Particulate Absolute (HEPA) ventilation units shall be used to maintain the negative pressure in each interior work area at 0.025 inches of water column and a minimum of four (4) air changes per hour.

B. The ventilation system shall remain in operation 24 hours a day until the work area has passed the specified clearance criteria. HEPA filtered air which is exhausted to maintain negative pressure shall be exhausted from the building at locations approved by the consultant and District or District's designated representative. Exhausted air shall not be near or adjacent to other building intake vents or louvers or at entrances to buildings.

C. The Contractor shall provide on-site independent DOP-equivalent testing to document the effectiveness of the air filtration units. The test results shall be signed by the individual performing the testing. Repeat testing if the unit or the air filtration units have been repaired or replaced. Provide documentation to the District or District's designated representative within 5 days of DOP-equivalent testing.

2.8 RESERVE EQUIPMENT:

A. Contractor shall have the following equipment on site: one functioning and DOP-equivalent tested HEPA Filter Vacuum Cleaning Unit in reserve and three functioning, DOP-equivalent tested HEPA area filtration unit. Contractor shall also have sufficient polyethylene, respirators, protective equipment, tape, tools, and decontamination enclosure systems for each work area.

B. Provide authorized visitors, Owner, Consultants, or other contractors requiring access to the work area with suitable protective clothing, headgear, and eye protection, as described in this specification, whenever the visitor must enter the work area. The Contractor shall have available and maintain adequate supplies of protective clothing and other suitable protective equipment for this purpose. All protective equipment shall be new and for the exclusive use of visitors.

C. The Contractor shall document that each visitor has been trained and fit-tested prior to entering an abatement area.

2.9 SCAFFOLDING:

A. Scaffolding, as required to do the specified work, shall meet all applicable safety regulations and DOSH standards. A non-skid surface shall be furnished on all scaffold surfaces subject to foot traffic. Scaffolding shall be adequately protected to prevent contamination of planking and framing.

2.10 TRANSPORTATION EQUIPMENT:

A. Transportation equipment, as required, shall be lockable and suitable for loading, temporary storage, transit, and unloading of contaminated waste without exposure to persons or property. Any vehicle used to transport asbestos waste shall be properly registered with all applicable controlling agencies.

2.11 CONNECTIONS TO WATER SUPPLY:

A. Contractor shall assure that all connections to the site's water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water shall not damage existing finishes or equipment.

B. Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system in each work area. Provide fittings as required to allow for connection to existing wall hydrants or spouts.

2.12 WATER HEATER:

A. The hot water supply must be adequate to allow for 15 minutes of continuous usage while maintaining a water temperature of 85°F. At minimum provide UL rated 20-gallon electric water heater to supply hot water for the decontamination unit shower. Provide relief valve compatible with water heater operation, pipe relief valve down to drip pan on floor with type L copper. Drip pans shall consist of a 24-inch X 24-inch X 6-inch-deep pan, made of 19-gauge galvanized steel with handles. Wiring of the water heater shall comply with National Electrical Manufacturers Association (NEMA), National Electrical Code (NEC), and UL standards.

2.13 OTHER TOOLS AND EQUIPMENT:

A. The Contractor shall provide other suitable tools for the stripping, removal, and disposal activities.

B. Prohibited Equipment: The following equipment is prohibited from use on this project unless accepted in writing by the District or District's designated representative:

1. High or low-pressure water blasting equipment for hosing of work areas.

2. Bead blasting or other uncontained abrasive blasting methods.
3. Vacuum-powered removal or collection equipment located outside the asbestos work area, such as a "Vacu-Loader".

4. Gasoline, propane, diesel, or other fuel powered equipment inside the building, unless previously approved in writing by the District or District's designated representative with constant monitoring of carbon monoxide concentrations.

5. Equipment that creates excessive noise or vibration that would affect the safety of the building or generate complaints from neighboring building occupants. No equipment shall exceed an A-weighted sound level of 85 dB as measured at 3 feet from the radiating source without written permission of the District or District's designated representative.

6. Metal wire-brushes.

7. Flammable solvents with a flash point below 140 degrees F or materials containing ethylene glycol ether, methylene chloride, ethyl chloroform (1,1,1-trichloroethane), or other hazardous substances.

8. Non-fire-retardant polyethylene sheeting.

9. Polyurethane spray foam for application in fire-rated assemblies, including but not limited to penetrations into stairwells, mechanical rooms, electrical closets, rated floor-to-floor assemblies, etc.

PART 3 - EXECUTION

3.1 INITIAL AREA ISOLATION

A. The Owner or the Owner's designated representative reserves the right to inspect and approve all containment setups before any abatement is undertaken.

B. If a containment area is breached (failure of polyethylene seals, visible dust emission, fiber counts above background level, etc.), the Contractor shall take immediate action to control the breach and clean the area to the satisfaction of the Owner or the Owner's designated representative.

C. If sample results indicate that conditions have exceeded the baseline or clearance criteria, as determined by the District or District's designated representative, all work shall cease. Work shall not recommence until the condition(s) causing the increase have been corrected.

D. Verify that all electrical power, gas, control water, fire life safety lines, and sprinkler systems to the work area have been isolated so that there is no possibility of reactivation and electrical shock.

E. Provide all connections for temporary utilities in the work area needed throughout abatement. Temporary electrical power shall be according to OSHA and the National Electrical Code for Wet Environments.

F. Contractor shall conform to lockout requirements and secure the work area at all times. Area entrances and exits shall be secured by the Contractor throughout the abatement phase. Unauthorized visitors are strictly prohibited. Only the District or District's designative representatives are permitted at the job site. Contractor shall ensure that all doors, gates, windows, and potential entrances to the work areas and the designated waste location areas are secured and locked at the end of each workday.

G. Contractor shall store all materials, equipment, and supplies for the project inside the building or in areas designated by the Owner and in accordance with Owner requirements.

H. As required, establish designated limits for the abatement work area with continuous barriers. Provide signs around the perimeter of all the interior works areas according to EPA and Cal-OSHA.

I. The Contractor shall be responsible for identifying all HVAC components (if applicable) that lead into or out of the work areas. All components shall be disconnected and sealed airtight for the duration of the abatement work. All openings shall be sealed with two (2) layers of 6 mil polyethylene secured with duct tape or equivalent, as applicable.

J. Protect fixed objects with protective barriers (as appropriate) and cover with 6 mil polyethylene sealed with tape.

3.2 CONTAINMENT SET-UP PROCEDURES

A. Containment is required for removal of all interior ACMs and exterior sealant/caulk. Contractor shall construct critical barrier containment(s). The work area(s) shall be placed under negative pressure as outlined in this specification throughout the abatement work period. Note: A three-chamber decontamination unit will be required for removal of ACMs if they are removed by aggressive means or mechanical removal methods. Cover floors and walls with 6-mil polyethylene and secure with tape for removal of wall or ceiling materials, as appropriate.

B. Any disturbance of ACMs must be performed within a regulated area. If dust or debris is generated from asbestos related activity, work must be performed in a negative pressure or critical barrier containment.

C. To permit the inspector to view the majority of the work area, the Contractor shall provide easily accessible viewing ports from the clean space into each abatement area. Viewing ports must be a minimum of 2' x 2', clear-see-through plastic with no scratches, tape, or glue marks.

D. Pressure differential recorders are required to monitor the pressure differential in the work area. The recorders must be calibrated prior to arriving on site. Calibration shall be performed by qualified technicians following the procedures outlined by the manufacturers. Provide documentation of calibration before beginning work.

E. A three-chambered decontamination unit shall be required during all Class I abatement work conducted in full containment. A two-chamber decontamination unit will be required for critical barrier work areas of all other interior ACMs. The unit shall be located immediately outside the contained area. A prefabricated unit is acceptable. Chambers shall be arranged as follows: (1) a clean/change room shall be the first chamber entered from outside the work area, (2) a shower shall be located between the clean/change room and the dirty/change room, and (3) a dirty/change room shall be the last chamber before entering the work area.

    1. The clean/change room of the worker decontamination unit shall be of sufficient size to accommodate the work crew and their belongings. It shall include a respirator storage area and be fully equipped with reserve equipment and materials such as clean suits, towels, soap, tape, and respirator filters.

    2. Worker decontamination unit walls shall be a minimum of two layers of 6-mil fire-retardant polyethylene and floors shall be constructed with a minimum of three layers of fire-retardant polyethylene. All entry and exit doorways shall consist of at least two sheets of overlapping, fire resistant polyethylene. At no time shall the flapped doors be taped open to expedite material or personnel load-out.

F. All water from the shower and bag wash area shall be filtered to the technically feasible limit, but not more than five (5) microns, before disposal. In addition, the Contractor shall comply with all current local, state, and federal codes relating to wastewater release. All water connections must be inspected for leaks and turned-off at the conclusion of each shift. All shower water shall be drained from the shower pan at the end of each shift.

G. A two-chamber decontamination unit may be allowed, unless noted elsewhere, during the abatement work conducted in critical barrier containments. The unit shall be located immediately outside the contained area and shall contain a wash down area. A prefabricated unit is acceptable.

H. Approved fire extinguishers (Class ABC, multi-purpose, dry chemical type, rated: 4A; 60BC) shall be readily available to workers (maximum travel distance of 50 feet) inside and adjacent to work area(s). Personnel and emergency exits shall be clearly indicated on the inside of the containment area. The emergency exit plan shall be approved by the consultant prior to the set-up of any work areas.

3.3 PERSONNEL PROTECTION

A. Informed Workers:

1. All workers shall be informed of the hazards of asbestos and ACMs and any other hazardous materials exposure present within the site. Workers shall also be instructed in the use and fitting of respirators, protective clothing, decontamination procedures, and all other aspects associated with the abatement work.

B. Personal Hygiene Practices:

1. The Contractor shall enforce and follow good personal hygiene practices during the abatement of ACMs. These practices will include but not be limited to the following: no eating, drinking, smoking, or applying cosmetics in the work area. The Contractor shall provide a clean space, separated from the work area, for these activities.

2. Workers shall remove street clothes in the clean room and put on a respirator and clean protective clothing before entering the work area. Remove gross contamination from clothing before leaving the work area; proceed to the change room and remove clothing except respirators; proceed to the shower; clean the outside of the respirator with soap and water while showering; remove respirator and thoroughly wash. Following showering, proceed directly to the clean room and dress in street clothes. Do not wear disposable clothing outside the decontamination enclosure system.

3. If data gathered by the consultant, District or District's designated representative in areas adjacent to the work areas shows exposure to airborne asbestos or other hazardous materials exceeding Cal-OSHA criteria, that area will become regulated, and workers must wear protective clothing and approved respirators and must have a shower facility provided to them.

C. Respirators:

1. Establish a respiratory protection program as outlined by ANSI and required by Cal-OSHA. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH). Respirators selected must be approved by the Competent Person. Submit program for review a minimum of five (5) working days prior to the commencement of abatement activities.

2. Provide workers with approved and personally issued respirators with replaceable filters. Provide sufficient quantity of filters approved by NIOSH for use in asbestos environments so that workers can change filters as required by the manufacturer.

3. At a minimum, provide each employee with the following respiratory protection for each work phase:

   a. Pre-cleaning, containment set-up, and containment removal work: NIOSH-approved, half-face respirators with HEPA cartridges.

   b. Asbestos abatement of caulking/sealant and drywall and joint compounds: half-face respirators with HEPA cartridges and organic vapor cartridges (as necessary).

4. At all times, respiratory protection selected shall, at a minimum, meet the requirements below.

Respiratory Protection	
Airborne Concentration of Asbestos	**Required Respirator**
Not in excess of 1.0 f/cc (10 X PEL)	Half-mask air purifying respirator other than a disposable respirator, equipped with high efficiency filters
Not in excess of 5.0 f/cc (50 X PEL)	Full facepiece air purifying respirator equipped with high efficiency filters
Not in excess of 100 f/cc (1,000 X PEL)	Any powered air purifying respirator equipped with high efficiency filters, or any supplied air respirator operated in continuous flow mode
Not in excess of 100 f/cc (1,000 X PEL)	Full facepiece supplied air respirator operated in pressure demand mode
Greater than 100 f/cc or unknown concentration	Full facepiece supplied air respirator operated in pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus

5. Provide Type C continuous flow or pressure-demand, supplied-air respirators if the average airborne concentration of asbestos exceeds 100 times the permissible exposure limit, i.e., 8-hour time-weighted average (TWA) and ceiling limit. Use the respirators presented in Title 8 CCR 1529 that afford adequate protection at such upper concentrations of airborne asbestos. When Type C Respirators are required provide the following:

   a. The air supply system shall provide Grade D breathing air that conforms to OSHA and ANSI Commodity Specification for Air.

b. Compressed Air System for Type C Respirators shall be high pressure, with a compressor capable of satisfying the respirator manufacturer's recommendations. The compressed air system shall have compressor failure alarm, high temperature alarm, and a carbon monoxide alarm. It also shall have suitable in-line air purifying absorbent beds and filters to assure Grade D breathing air.

c. Use of Belt: Type C respirators shall be worn with belt to minimize possibility of dislodging face mask when hose is snagged in the work area.

D. Protective Clothing:

1. Provide personnel exposed to asbestos fibers with fire-retardant disposable protective whole-body clothing, head coverings, gloves, and foot coverings. Provide appropriate gloves to protect worker’s hands from exposure to hazardous materials. Make sleeves secure at the wrists and make foot coverings secure at the ankles with tape. Ensure that all personnel entering and leaving the work area follow this procedure. Suits shall be of adequate size to accommodate the largest employee. Foot covers may be part of the coveralls. Non-disposable footwear shall be left in the work area until it is decontaminated or disposed of at the completion of the job.

2. Protective clothing will be worn inside the work area after the area passes pre-abatement inspection and shall remain in use until the area passes final clearance inspection.

E. Eye Protection:

1. Provide safety glasses or goggles to personnel removing or handling asbestos-containing materials and waste.

F. Shower Requirements:

1. Contractor shall assure that all certified employees and visitors use protective equipment and the shower or wash down facility following each entry into the containment area after the start of the asbestos abatement.

G. Emergency Precautions and Procedures:

1. Establish emergency and fire exits from the work area. Display necessary signage at exits and paths to exits with representative visual aids. A diagram of all emergency and fire exits shall be posted in a conspicuous area proximate to the entrance to each work area.

2. The Contractor’s supervisor/competent person shall be trained and certified in first aid and CPR and be prepared to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination. When an injury occurs, the Contractor shall implement fiber reduction techniques until the injured person has been removed from the work area.

3. In the event of a loss of negative pressure to the work area, work shall stop immediately and entrances to the work area sealed tight. The Contractor shall also institute fiber reduction controls until negative pressure is re-established to acceptable levels.

3.4 ASBESTOS REMOVAL (GROSS REMOVAL TECHNIQUE)

A. The Contractor shall abate all ACMs identified in this specification and/or that require disturbance to complete work specified in other specification sections.

B. The Contractor shall continuously apply a wetting agent throughout the removal process. The wetting agent shall be applied with a low-pressure fine spray to minimize fiber releases. The materials shall be thoroughly saturated so that there is no detectable fiber release. All ACMs shall be immediately packaged in leak-tight containers following removal.

C. Minimize removal activities of ACMs that generate airborne particulate. To the extent feasible, score or cut-out ACMs in sections, wetting along the scoring line continually, and misting the air with an airless sprayer to knock down suspended particulate. After completion of removal work, surfaces from which asbestos has been removed shall be brushed and/or wet cleaned to remove all visible material and residue.

D. Wet clean the exterior surfaces of waste containers in the equipment decontamination enclosure system prior to removal from the work area. Ensure that workers enter from uncontaminated areas into contaminated areas through the equipment decontamination enclosure system. The Contractor shall transport asbestos-containing waste bags to the waste debris box at designated hours approved by the District or District's designated representative.

E. RACM shall be packaged in a minimum of two (2) 6-mil polyethylene bags. Bags shall be properly labeled for RACM disposal including site-specific generator labels.

F. Non-friable waste shall be packaged in clear, leak tight containers and properly labeled while stored on-site.

G. Asbestos-containing debris and contaminated water shall be cleaned from the work area at the end of each work shift. The Contractor shall clean the work area using wet methods and HEPA vacuum equipment.

3.5 REGULATED AREA MONITORING

A. Prior to each work shift and continuously throughout the project, each containment and decontamination enclosure system shall be inspected and repaired as needed.

B. Ambient asbestos fiber levels outside each work area shall not exceed 0.01 f/cc (PCM) or 70 s/mm^2 (TEM) or background levels whichever is greater. If the asbestos fiber concentrations outside work areas exceed those levels shown above, then abatement must stop, and operations be reviewed and modified until the fiber count can be reduced to within the acceptable limits.

3.6 AIR MONITORING

A. The purpose of any air monitoring that may be conducted by the District or District's designated representative will be to detect possible release of fibers or dusts (asbestos or lead) emanating from the work areas.

B. All PCM air sample analysis shall comply with NIOSH Method 7400. TEM analysis shall be consistent with modified-AHERA protocols, Yamate or NIOSH 7402. Post removal TEM air clearance samples must be analyzed by AHERA protocol.

C. The District or District's designated representative reserves the right to perform and/or observe final clearance inspection and sampling.

D. The method of analysis for pre-abatement and clearance air samples for non-friable material removals may be via Phase Contrast Microscopy (PCM). The method of analysis for in-progress asbestos air samples shall be PCM and TEM at the option of the consultant and District or District's designated representative.

E. The Contractor shall be responsible for all personal air sampling. These samples shall be taken each shift and for each distinct crew operation and shall be used to verify adequacy of fiber control and respiratory protection. Personal breathing zone air sampling shall be in accordance with the Cal-OSHA asbestos standard. A minimum of 25% of the workforce shall be monitored during each shift. All sample results shall be available on-site within 24-hours of sample collection.

3.7 CLEARANCE INSPECTIONS

A. The consultant shall conduct visual inspections. Contractor shall notify the consultant when the decontamination process in each containment area is complete. Evidence of debris will require additional clean up by the contractor. Contractor shall be responsible for re-cleaning all areas found to be deficient.

B. If the consultant determines that the work area is sufficiently clean, the Contractor may proceed. If the consultant determines that certain areas require additional cleaning, the Contractor shall re-clean the work area and request a second inspection of the re-cleaned area.

C. Once the initial visual is passed, the Contractor shall remove all but the containment critical barriers.

D. Following the visual inspection and removal of all but the critical barriers, the Contractor may provide a coating of non-diluted encapsulant in the work area. Encapsulant shall not be applied to existing finishes. The Contractor shall allow the encapsulant to dry for the period specified by the manufacturer.

E. Asbestos Clearance Testing: Following encapsulation and drying time, the consultant shall conduct air clearance sampling. Clearance air sampling shall not take place until all encapsulant is dry. The District or District's designated representative reserves the right to approve the initiation of clearance sampling.

3.8 ASBESTOS CLEARANCE CRITERIA:

A. The clearance level per containment shall be less than 0.01 fibers per cubic centimeter via phase contrast microscopy (PCM) or less than 70 structures per square millimeter via transmission electron microscopy (TEM). Aggressive air sampling shall be used for clearance purposes. Multiple samples shall be collected in large containment areas.

B. If air samples do not pass the required clearance criteria, the area shall be re-cleaned, and new samples shall be collected by the consultant. The Contractor shall be responsible for all costs associated with re-sampling and re-analyses.

C. The consultant will notify the Contractor and District or District's designated representative in writing of acceptable asbestos fiber concentrations. The Contractor shall then remove all the remaining barriers in the work area.

3.9 ASBESTOS DISPOSAL

A. It is the responsibility of the Contractor to determine current waste handling, labeling, transportation, and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply fully with these Specifications, local, state, and federal regulations and provide documentation of the same.

B. Ensure that polyethylene bags are sealed airtight. All bags shall be wet cleaned prior to removing them from the equipment decontamination enclosure system.

C. Ensure all disposal containers are properly labeled according to 8 CCR 1529, 5194 (HAZCOM), 49 CFR 171-179 (USDOT), 40 CFR 61 Subpart M (NESHAP), and any local regulations and state regulations as required by this specification.

D. Filter all wastewater to the technically feasible limit, but not more than five (5) microns before disposal. Comply with all current local, state, and federal codes relating to wastewater release.

E. Asbestos-containing waste that is properly labeled and double-bagged may be temporarily stored in areas approved by the Owner. Areas must be made secure before storing the waste. Waste is not to remain in temporary storage area for longer than ten (10) days before final load-out of materials.

F. All friable asbestos waste shall be double wrapped prior to transport from the site.

G. All vehicles used to transport hazardous waste must be registered with the Department of Toxic Substances Control and Department of Transportation and always maintain proper registration with vehicle.

H. Trucks must have an enclosed cargo area with a storage compartment that is fully lined with a minimum of one (1) layer of 6-mil polyethylene on the walls and two (2) layers on the floor.

I. All vehicles and containers used to transport waste are subject to inspection and approval of District or District's designated representative prior to departure from site.

J. Contractor shall not throw bags into the truck in a way that may cause the bags to burst open.

K. Contractor shall provide at minimum two (2) days advance notification to the Owner when signatures are required on manifest(s). The Contractor shall ensure that the Hazardous Waste Manifest is correctly filled out. The Contractor shall give the appropriate copies to the Owner and shall also instruct the Owner in writing that they must send the appropriate copy to the Department of Toxic Substances Control.

L. Contractor is responsible for all coordination with the waste disposal site and with the waste hauling company.

M. Debris box for hazardous waste shall be fully lined with a double layer of polyethylene sheeting and must be locked at all times when unattended.

N. Once the debris box is filled and the manifest is signed, Contractor must transport the debris box off the job site.

O. Waste disposal shall be in a landfill approved by the District or District's designated representative that meets current federal EPA and state requirements.

TABLE I
ESTIMATED QUANTITIES OF AFFECTED ACCMs and ACMs

HM # / Material Description	Material Location	Asbestos Content by layer	NESHAP Category	Est. Qty.
HM 09 / Off-white Exterior Sealant - Brick to Stucco	At Entry to each Restroom	Off-white Sealant: 2% CH	Cat. II	300 sf
HM 13 / 4" Light Yellow Ceramic Wall Tile with Grout and Mortar	Boys' and Girls' Restrooms	Yellow Ceramic Tile: ND Dark Gray Mortar: ND Light Gray Grout: ND Off-white Compound: 2% CH	N/A	4,000 sf
HM 14 / Drywall with Joint Compound	Boys', Girls', and Special Education Restrooms - Walls and Ceilings	*By PLM analysis:* Off-white Joint Compound with Paint: 2% CH White Drywall with Brown Paper: ND *By 400-point count composite:* Drywall/Joint Compound: <0.25% - 0.75% CH	N/A	1,200 sf

ND = None Detected, NA = Not Applicable, NE = Not Estimated, CH = Chrysotile, RACM = Regulated asbestos containing material (friable), Cat. I = Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal), Cat. II = Category II Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal), sf = square feet, lf = linear feet, ea = each, *Estimate quantity should be field verified prior to abatement

END OF SECTION

ATTACHMENT A
ASBESTOS ABATEMENT WORK PLAN OUTLINE

In accordance with the contract documents, the Contractor is required to prepare a written, site-specific Asbestos Abatement Work Plan, and submit to the Owner for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA requirements as well as the contract documents and shall describe work procedures and control methods that will protect the Owner's facilities and the environment.

I. Location of Work:

The work to be completed under this work plan will be completed at:
Building name
Location within building

Previous asbestos inspections or surveys have found that ACMs are present at the following locations:
List all materials and locations to assure the Owner and the Contractor are aware of all hazardous materials locations

II. Description of Work:

Describe the anticipated work scope

III. Schedule:

Phase/Task	Anticipated Date(s)
Mobilization	_____
Set-up of work area(s), containments	_____
Abatement	_____
Final Cleaning	_____
Visual Inspection	_____
Final Clearance (visual and air sampling)	_____
Teardown	_____
Demobilization	_____

IV. Equipment and Materials:

List all equipment and materials to be used, such as the following:

HEPA Vacuums	Negative air filtration units
Scrapers	Manometers
Power saws	Shower facilities
Pry bars	Airless sprayers/compressors
Cutting shears	Cleaning detergents
Other hand tools	Solvents (must be approved by Owner)
Encapsulants/sealants	Roller/brushes
Gloves	Disposable coveralls
Respiratory protection	Eye & foot protection

V. Crew

List all workers and supervisors with emergency contact names and phone numbers. Clearly identify the supervisor and competent person who have authority for all safety and health.

VI. Control Measures and Work Practices

Describe in narrative format specific work procedures, exposure/ contamination controls, and engineering controls. This description should include, but not be limited to, the following:

OSHA Class I, II, III and IV work	Wet methods
Negative pressure enclosure	Glove bag removal
Respiratory protection	HEPA vacuums
Mini-containments	Solvent removal of mastic
List other procedures	

VII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required. List all personal protective equipment anticipated to be used on the project.

VIII. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies. Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site.

Describe handling or treatment of asbestos-contaminated solid waste and wastewater.

IX. Air Monitoring Data

Identify general worker air monitoring protocols to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc. Identify the competent person responsible for conducting personal air monitoring.

X. Containment Diagram

Include a diagram (handwritten is acceptable) of the containment(s) showing the containment perimeter in relation to the surrounding areas, locations of negative air machines and exhaust locations, direction of airflow, and decontamination areas.

XI. Waste

Describe how all waste on this project will be packaged, labeled, stored, transported, manifested, and disposed

XII. Preparation of Asbestos Abatement Work Plan

Date Prepared and Prepared By (signature, name, and title)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions and Division I General Requirements shall be included in and made part of this Section.

B. Examine all project drawings and documents including other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.2 SUMMARY OF LEAD RELATED WORK

A. General. This section involves the requirements for removal and/or disturbance of building materials and painted components that contain detectable quantities of lead. Existing building materials and components with paint coatings considered to be lead containing paint (LCP) or lead containing materials (LCM) include but are not limited to: 4” yellow ceramic wall tile, blue paint on doors and door frames, and off-white paint on drywall walls and ceilings. All painted surfaces not specifically tested shall be assumed to contain lead.

The following bulk material in Building F student restrooms is lead containing and requires segregation due to lead content: Ceramic wall tile, paint chips, and building components coated with lead-containing paint. The intent of this work and the required procedures is to minimize lead emissions and contamination resulting from demolition and dismantling of the building and equipment that will impact lead containing materials.

B. Lead-Related Construction Work: The Contractor's lead related construction work consists of any work activity or task which results in the coincidental removal or disturbance of paints, surface finishes, or other lead containing materials. The Contractor shall determine and implement applicable OSHA worker protection requirements (8 CCR1532.1) and ensure proper clean up and disposal of any resulting paint chips and lead wastes (including water) resulting from all lead-related construction activities including, but not limited to, the following:

1. Removal of all damaged or peeling paint from painted interior materials prior to demolition, as needed.

2. Cleanup of paint separated from building components during demolition.

3. Removal of lead containing materials such as ceramic wall tile.

4. Demolition of drywall with lead containing paint.

5. Demolition that will impact existing painted surfaces including but not limited to drilling, cutting, and removal of existing of attachments such as electrical, mechanical, or structural.

C. Specific Scope of Work: Lead-related construction work scope as described above shall also include the following:

1. Building F – Removal of 4” yellow ceramic wall tile in the Boys’, Girls’, and Special Education Restrooms as needed for modernization. Estimated quantity: 4,000 square feet

1.3 REGULATIONS

A. The Contractor shall comply with the requirements of the current issue of the following regulations and guidelines governing lead removal, lead-related construction, and disposal and other applicable Federal, State, and Local Government regulations. The regulations listed herein are incorporated by reference.

1. Code of Federal Regulations (CFR):
   a. 29 CFR 1926, Construction Standards
   b. 29 CFR 1926.62, Lead in Construction
   c. 29 CFR 1910.94, Ventilation
   d. 29 CFR 1910.134, Respiratory Protection
   e. 29 CFR 1910.1025, Lead
   f. 29 CFR 1910.1200, Hazard Communication
   g. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists
   h. 29 CFR 1926.57, Ventilation
   i. 40 CFR Part 50.12, Ambient Air Quality Standard for Lead
   j. 40 CFR Parts 260, 261, 262, 263, 264, 265 and 268, Hazardous Waste Management
   k. 49 CFR Parts 172, 173, 178, 179, Hazardous Material Transportation

2. California Code of Regulations:
   a. 8 CCR Division 1, Chapter 4, Subchapter 4, Construction Safety Orders
   b. 8 CCR 1532.1, Lead in Construction of Coated Metals
   c. 8 CCR 1537, Welding, Cutting, and Heating of Coated Metals
   d. 8 CCR 5144, Respiratory Protection
   e. 17 CCR 35001 – 36100, Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards
   f. 26 CCR Division 22, Hazardous Waste

3. Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing, U.S. Department of Housing and Urban Development (HUD), June 1995.

1.4 DEFINITIONS

A. The following definitions pertain to the work of this section:

1. Abatement: Procedures for control of lead exposures to the Contractor's workers, Owner Employees, Public and the environment by removal, enclosure, and/or encapsulation of lead containing paints (LCPs), Lead Containing Construction Materials (LCCMs), and LCP coated components and proper clean up and disposal of resulting lead contaminated dust, chips, debris, and abatement wastes. Also include procedures for control of lead exposures resulting from welding or other hot work on surfaces with LCPs or residues.

2. Action Level (AL): An exposure of 30 µg/m3 of airborne lead as an 8-hour TWA. When the AL is met or exceeded, certain protective health and safety measures are triggered per 8 CCR1532.1 Lead.

3. Action Levels for Lead Content: The levels of lead concentration established for each type of analysis performed, which if the lead concentration equals or exceeds the action levels specified herein, renders the material hazardous.
   a. Action Level for Toxicity Characteristic Leaching Procedure (TCLP) by EPA 200.7: Action level for TCLP is 5.0 milligrams per liter.
   b. Action Level for Total Threshold Limit Concentration (TTLC) by EPA 6010: Action level for TTLC is 1,000 milligrams per kilogram.
   c. Action Level for Soluble Threshold Limit Concentration (STLC) by EPA 200.7: Action level for STLC is 5.0 milligrams per liter.

4. Airlock: A system for permitting ingress or egress with minimum air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least three feet apart.

5. Air Monitoring: The process of measuring the lead content of a specified volume of air in a stated period of time.

6. Area Monitoring: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations that may reach the breathing zone of personnel potentially exposed to lead.

7. Authorized Visitor: District or District's Representative, Architect, Contractor's Observation Service, or a representative of any regulatory or other agency having jurisdiction over the project.

8. Change Room and Shower Facilities: Rooms within the designated boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.

9. Clean Room: An uncontaminated area or room which is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.

10. Competent Person: An onsite supervisor who has been formally trained in lead abatement and who is capable of identifying lead hazards, substandard and improper lead abatement controls, procedures, practices, and conditions and who has sufficient experience and authority to take prompt corrective measures to eliminate them.

11. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).

12. District: Lodi Unified School District

13. District's Observation Service: Consultant retained by the Owner to inspect work areas, and collect environmental samples (air, bulk, waste).

14. DOP Test: Test of a High Efficiency Particulate Absolute filter (HEPA) system to verify that a minimum of 99.97% of all particles 0.3 microns in diameter are captured by the filter system test must be conducted with dioctylphthalate (DOP) test aerosol or equivalent in accordance with ANSI Z9.2 1979 and Federal Standard 209 B for Class 100 air and as indicated in UL 586.

15. Eight-Hour Time Weighted Average (TWA): Airborne concentrations of lead averaged over an 8-hour workday to which an employee is exposed.

16. Fixed Object: A unit of equipment or furniture in the Work Area which cannot be removed from the Work Area.

17. Hazardous Waste: Lead paint debris and materials shall be classified as hazardous due to the characteristic of toxicity, as determined by testing in accordance with the California Code of Regulations, Title 22, Division 4, Chapter 30, Article 11. Any substance(s) listed in Article 11 Section 66699 at concentrations greater than their listed Soluble Threshold Limit Concentration (STLC) or Total Threshold Limit Concentration (TTLC) may need to be further characterized by the Toxicity Characteristic Leaching Procedure (TCLP) in accordance with 40 CFR 261 and other tests prior to disposal as a hazardous waste.

18. HEPA Exhaust System: A portable local exhaust system equipped with HEPA filtration and capable of maintaining a constant, low velocity air flow into contained contaminated areas from adjacent uncontaminated areas when used as Differential Pressure Equipment. Also capable of use as local exhaust to control lead fumes generated from hot work.

19. HEPA Filter: A High Efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97% of lead particles greater than 0.3 microns in diameter.

20. HEPA Vacuum Equipment: High efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining lead dust. Filters shall be certified to be of 99.97% efficiency for retaining particles of 0.3 microns diameter or larger.

21. Intact LCP Components: LCP components removed substantially intact with LCP firmly adhering to the surface. Examples are door, door trim, baseboards, etc., with intact paint. Also referred to as architectural debris with intact paint.

22. Lead Based Paint (LBP): Lead Containing Paint (LCP) that is at least 0.5% lead by weight when analyzed by AAS or ICP AES (equivalent to 5000 ppm of lead) or 1.0 milligrams of lead per square centimeter (mg/cm2) as determined by XRF testing or as identified by specification. LBP is also a Lead Containing Construction Material (LCCM).

23. Lead Containing Construction Materials (LCCM): Any construction material:
    Containing lead at analytically detectable levels greater or equal to 50 ppm; or
    Containing paints or other finishes with lead at levels greater than 600 ppm; or
    Consisting of paints containing lead at any level capable of posing an occupational or environmental hazard during any phase or process of the current construction or demolition project.

Occupational hazards shall be considered evident when airborne exposure levels exceed or are likely to exceed the permissible exposure level (PEL) set by Cal/OSHA.

Environmental hazards shall be considered evident when lead surface contamination levels exceed 800 µg/ft2 on Work Area surfaces and/or when any of the State or Federal hazardous waste criteria for lead is met or exceeded.

24. Lead Containing Paint (LCP): Any paint or finish coating with a detectable lead content. Cal/OSHA regulation requires assessment of employee exposure for all tasks where lead is present at this level or higher. Note: At lead levels below 0.06% exposure assessments are still required for "Trigger Tasks".

25. Lead Control Area: An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of LCP removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

26. Lead Related Waste: Paint chips, vacuum dust, and debris, used cleaning articles, waste water, plastic sheets and other disposable items which were used during the LCP abatement process and as a result are considered lead contaminated waste or assumed hazardous waste pending further characterization.

27. Lead Impacted Construction: Any construction activity, excluding abatement, which disturbs lead or lead containing paints or coatings and which may, under specific circumstances, result in worker and or environmental exposure.

28. Lead Related Construction: Any construction activity or process including but not limited to lead abatement, LCCM (i.e., paint) removal lead impacted construction, or welding on lead containing surfaces which may expose workers, building occupants, or the environment to a release of airborne lead or surface lead contamination.

29. Mini containment or Mini enclosure: A small temporary enclosure constructed of impervious material (such as plastic sheeting) with at least one airlock to permit ingress and egress. The entire Work Area is contained or enclosed by this system to prevent the escape of contamination outside the Work Area.

30. Permissible Exposure Limit (PEL): An exposure to airborne lead of 50 micrograms of lead per cubic meter of air (50 µg/m3), averaged over an 8-hour workday which is referred to as a time weighted average (TWA). This is the highest level of Lead in air an employee can be permitted to be exposed to in an eight-hour workday. For longer workdays, the PEL is lowered and can be determined by dividing 400 by the number of hours worked per day. When the PEL is exceeded, the Contractor must take action to lower the exposure level and protect the worker per 8 CCR1532.1 Lead.

31. Personal Monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour TWA concentration in accordance with Title 8 CCR 1532.1. Samples shall be representative of the employee’s work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulder, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

32. Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, “inside boundary” shall mean the same as “outside lead control area”.

33. Qualified Person: The individual identified by the Contractor to be responsible for conducting air sampling, calibration of air sampling pumps, evaluating sampling results, and conducting respirator fit tests.

34. Recognized Training/Educational Institution: University, college, Steel Structures Painting Council, or a professional training organization funded by or meeting U.S. Environmental Protection Agency (EPA) and/or California Department of Public Health (DPH) training accreditation requirements for contractors performing lead-based paint or construction related work that exceeds the Department of Occupational Safety and Health (DOSH) Permissible Exposure Limit (PEL) for lead.

35. Removal: All herein specified procedures necessary to remove and clean up all LCCM or LCP from the designated areas and to dispose of these materials at an acceptable site in accordance with Federal, State and Local Regulations. Removal of LCP may be by whole painted component or by removing LCP from painted components either onsite or offsite.

36. Trigger Task: Task specifically identified by the CAL/OSHA Lead standard as a potential exposure hazard requiring certain protective measures to be implemented prior to obtaining the results of an initial exposure assessment. Trigger tasks include, but are not limited to, any of the following tasks when materials or paints which contain lead are present and will be disturbed:
    a. Manual demolition
    b. Manual scraping or sanding
    c. Heat gun application
    d. Use of power cleaning tools
    e. Rivet busting
    f. Abrasive blasting
    g. Welding, cutting, or torch burning

37. Visually Clean: Free of visible dust, paint chips, dirt, debris, or films removable by vacuuming or wet cleaning methods specified. For outside soil or ground cover areas, visually clean shall mean free of construction or paint debris, chips, or dust distinguishable from the initial soil or ground conditions.

38. Washroom: A room or area established outside the Work Area for hand washing at minimum. Where the lead PEL is exceeded, the washroom shall contain a shower facility with hot and cold water and a water filtering system.

39. Wet Cleaning: The process of eliminating lead contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been washed with specified detergent solutions and rinsed with clean water.

40. Work Area: A designated and controlled area in which lead abatement actions are undertaken or which may become contaminated as a result of such actions. A Work Area is a controlled area delineated at minimum by barrier tape (or similar means) and signage to restrict access to Authorized Personnel. In some instances, a higher degree of physical isolation and control may be required and specified.

1.5 SUBMITTALS AND NOTICES

A. Requirements are as set forth in the General Conditions and Division 1, for items required to be submitted under this section.

B. Product data shall include manufacturer's product data, specifications, samples and application instructions and other pertinent information necessary.

C. Project procedure submittal for LCP coating removal. Submit the following:

1. Detailed work plan for removal of all damaged or intact lead-related paint removal including:
   a. removal method to be employed,
   b. lead contamination controls for each different type of method or work operation involving lead containing paint removal,
   c. equipment and materials proposed to be used on LCP coatings,
   d. the procedures and practices for protection of building occupants and the environment, and
   e. detailed description of Work Area preparation and containment controls for lead-related construction work, cleaning and decontamination procedures, signage, and security measures.

2. Detailed plan for disposal of lead contaminated wastes generated by this work in accordance with all applicable Federal, State and Local regulations. Each separate waste stream should be addressed including name of waste stream, methods of handling, packaging, labeling, storage, transportation, and disposal or recycling. For materials to be disposed, indicate the classification of the waste (RCRA hazardous, California hazardous or non-hazardous).

3. Method of transport of hazardous waste including name, address, EPA I.D. number, and telephone number of the transporter and the name, class, address, EPA I.D. number, and telephone number of hazardous waste site(s) to be utilized for disposal of each waste stream.

4. Proposed location, size, and type of secured waste storage containers to be used. Include system that will be used for segregating different waste streams.

5. Detailed schedule for completion of lead-related construction work to be updated on a weekly basis indicating tasks being performed until job completion.

6. Detailed plan for protection of workers conducting lead-related construction work which includes all information required for the CAL/OSHA lead compliance plan per Title 8 CCR 1532.1. At minimum, for each removal method, the plan shall detail protective clothing and equipment and procedures and worker decontamination facilities and procedures.

D. Project Procedures Submittal for Hot Work on LCP Surfaces

1. Detailed work plan for containment and removal of lead containing paint, capture of fumes from any hot work including welding and torch cutting on painted structural steel or painted mechanical components. Include equipment and materials proposed to remove paint, capture, HEPA filter, and exhaust all lead containing fumes for protection of workers, building occupants, and the environment.

2. Cal/OSHA lead compliance plan for welders per 8 CCR 1532.1 Lead.

3. Daily air monitoring plan to verify that airborne lead levels do not exceed the specified limits in any occupied areas of the building.

E. Project procedure submittal for lead-related construction demolition (removal of plaster, drywall, concrete, stucco) with LCP, cutting and demolition of concrete, demolition of painted mechanical components, removal of ceramic tile, resilient flooring). Submit the following:

1. Detailed work plan for all lead-related construction including:
   a. removal method to be employed,
   b. lead contamination controls for each different type of method or work operation involving lead containing materials,
   c. equipment and materials proposed to be used on lead containing materials,
   d. the procedures and practices for protection of building occupants and the environment, and
   e. detailed description of Work Area preparation and containment controls for lead-related construction work, cleaning and decontamination procedures, signage, and security measures.

2. Detailed plan for disposal of lead contaminated wastes generated by this work in accordance with all applicable Federal, State and Local regulations. Each separate waste stream should be addressed including name of waste stream, methods of handling, packaging, labeling, storage, transportation, and disposal or recycling. For materials to be disposed, indicate the classification of the waste (RCRA hazardous, California hazardous or non-hazardous).

3. Method of transport of hazardous waste including name, address, EPA I.D. number, and telephone number of the transporter and the name, class, address, EPA I.D. number, and telephone number of hazardous waste site(s) to be utilized for disposal of each waste stream.

4. Proposed location, size, and type of secured waste storage containers to be used. Include system that will be used for segregating different waste streams.

5. Detailed schedule for completion of lead-related construction work to be updated on a weekly basis indicating tasks being performed until job completion.

6. Detailed plan for protection of workers conducting lead-related construction work which includes all information required for the CAL/OSHA lead compliance plan per Title 8 CCR 1532.1. At minimum, for each removal method, the plan shall detail protective clothing and equipment and procedures and worker decontamination facilities and procedures.

F. Lead Paint Removal Personnel Qualification and Protection Submittal. Submit the following:

1. Employee training certifications demonstrating that all employees engaged in LCP removal (damaged or intact) activities have attended formal lead hazard and lead related construction training by a Recognized Training/Educational Institution. All training for other lead related construction activities shall be in accordance with the worker training provisions in the CAL/OSHA and California Department of Public Health (DPH) lead regulations and this specification:
   a. The minimum acceptable training course duration is 40 hours for the Contractor's lead abatement Supervisor/Competent Person and all workers conducting removal of LCP.
   b. The minimum training course for workers conducting other lead related construction work shall meet all requirements of 8 CCR1532.1, Lead. Documentation shall consist of training institution certificates or certification by trainer for each employee with dates trained and a copy of the training syllabus.
   c. Updated information shall be provided in advance of on-site lead worker personnel changes.

2. Documentation that all employees engaged in lead-related construction activities, or the "Trigger Tasks" have had the appropriate medical examinations specified in Title 8 CCR1532.1 within the prescribed time periods immediately preceding project start up. It shall be the Contractor's responsibility to secure any and all medical and exposure information releases required for employee records in accordance with regulation. Evidence of medical requirement compliance shall include, but are not necessarily limited to:
   a. Documentation of medical surveillance examination by a licensed medical physician prior to commencement of onsite LCP related work including baseline blood lead levels performed within the last six (6) months.
   b. Statement by the examining physician that employee is fit to wear a respirator in accordance with 8 CCR 1532.1 within the last twelve (12) months.

3. Documentation that all employees required to wear respirators has passed respirator fit tests within the past twelve (12) and has been assigned individual respirators which fit them.

4. Methods, procedures, and plan for monitoring employee airborne lead exposure during lead abatement activities. Methods and procedures, at a minimum, shall comply with requirements outlined in Title 8 CCR 1532.1 Lead.

G. Lead Related Construction and Equipment Submittal. Submit the following.

1. Calibration data showing where secondary standards (rotameter) for personal air monitoring equipment have been calibrated from a primary standard within the last 30 days from the date of submittal.

2. Product data sheets and safety data sheets (SDSs) for each product proposed for use on this project such as wetting agents, chemical paint removers, detergents, adhesives, and abrasives.

3. Manufacturer’s certification that HEPA vacuums, HEPA ventilation equipment, and other equipment required to contain airborne dust and fume conform to ANSI Z 9.2

4. Certification that HEPA filter exhaust systems have been DOP-equivalent tested in place after installation and been found to provide 99.97% efficient air cleaning for particulates greater or equal to 0.3 microns in diameter. All DOP-equivalent filter certification testing shall be conducted on site by an independent testing firm.

H. Lead Related Construction/Paint Removal Daily Submittal. Submit the following documentation daily to the District's Observation Service within 24 hours of initiation:

1. An accurate daily entry log or roster of all authorized personnel entering and exiting the Work Area.

2. Copies of initial and periodic personnel air monitoring laboratory results and calculated eight-hour time weighted average results for each employee monitored shall be provided within 48 hours of sample collection.

3. Provide District's Observation Service at least 24 hours' notice prior to scheduling startup of each different by type of lead related construction operation including chemical paint removal, manual demolition of paint finishes or equipment, and hot work on lead containing surfaces.

4. Updated training and medical certifications (as required herein) shall be provided prior to assignment of new personnel and for existing personnel prior to the stated allowable time limits or expiration dates. The allowable intervals since the last medical examination (12 months), blood lead test (6 months), or fit test (12 months), shall not be exceeded.

1.6 OBSERVATION SERVICE

A. The District's Observation Service is authorized to provide lead removal and lead related construction compliance observation and monitoring, testing, and technical oversight services including, but not limited to:

1. Airborne lead monitoring to evaluate the effectiveness of the Contractor's lead dust and fume control work practices, procedures, and dust containment methods. The results from this monitoring shall be used to evaluate the Contractor's personal monitoring data and to evaluate the Contractor's compliance with occupational and environmental regulations.

2. Visual inspections to verify if the Contractor has met the requirements for various phases of the lead related construction process including Work Area preparation, removal, and clean up and decontamination.

3. Verify the classification of the typical waste streams produced by lead-related construction work according to existing California hazardous waste criteria by laboratory analysis.

B. The District's Observation Service will perform the following:

1. Inspect the preparation of work areas prior to lead-related construction work.

2. Review the Contractor's initial and periodic lead exposure air monitoring results.

3. Inspect paint removal on painted steel prior to hot work.

4. Periodically, inspect lead-related construction work areas.

5. Conduct a post work visual inspection of all work areas and wipe testing if requested by the Owner.

6. Verify waste stream testing produced by lead-related construction work according to existing California hazardous waste criteria by laboratory analysis.

1.7 CONTRACTOR'S COMPLIANCE AND QUALITY ASSURANCE

A. The Contractor shall have a Competent Person onsite at all times while lead-related construction work is in progress. The Contractor's Competent Person shall communicate and coordinate with the District's Observation Service with regard to work schedule, inspections, daily submittals, and compliance issues.

B. The Contractor's Competent Person shall:

1. Ensure the Contractor's compliance with the plans, specifications, and work plans.

2. Conduct worker exposure monitoring using a Qualified Person and provide results to the District's Observation Service.

3. Pre-inspect Work Areas for compliance and completion prior to notifying the District's Observation Service of the Work Area's readiness for inspection.

4. Accompany the District's Observation Service during Work Area pre-start and clearance inspections upon request.

5. Ensure all of the Contractor's lead related construction workers have current valid medical, blood lead test, training, and respirator fit testing records where required and provide copies of all new or updated records to the District's Observation Service for approval before assigning the workers to any work within Work Areas.

6. Take timely and appropriate corrective actions to ensure compliance with the lead-related construction specifications and to eliminate unsafe, unhealthy, and environmentally unsound work practices regardless of whether or not they are brought to the Contractor's attention by the District's Observation Service.

7. Adhere by the initial characterization of waste for proper packaging, labeling, storage, transportation, and disposal of waste. Ensure any additional waste testing required is completed and ensure proper storage, shipping, and timely disposal of all hazardous waste.

PART 2 - PRODUCTS

2.1 PROTECTIVE COVERING

A. Polyethylene sheets, fire resistant, of 6 mil thickness in size (dimensions) to minimize the frequency of joints.

2.2 CLEANERS

A. For cleanup and decontamination, a tri-sodium phosphate (TSP) wash solution containing at least five percent (5%) TSP shall be used. Alternative cleaning and decontamination agents shall be subject to approval by the District's Observation Service and District's Representative.

2.3 TAPE

A. Duct tape (or approved equivalent) two (2) inches or wider, capable of sealing joints of adjacent sheets of polyethylene sheeting and for attachment of polyethylene sheeting to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions.

2.4 CHEMICAL PAINT REMOVAL SYSTEMS

A. Chemical paint removal systems shall be selected on the basis of the type of paint/coating to be removed, the substrate type, and chemical compatibility with new coating systems to be applied. Chemical removal systems shall effectively remove paint without adversely affecting the treated surface's suitability for repainting or adversely affecting the bonding, appearance, or durability of the coatings to be applied.

B. Chemical paint removal systems containing methylene chloride are prohibited.

C. Submit manufacturer's product data sheets for each chemical remover for review and evaluation by the District's Observation Service and District's Representative. All chemical paint remover products are subject to approval by the District's Observation Service and District's Representative.

2.5 SPRAY ADHESIVE

A. Provide spray adhesive in aerosol cans which is specifically formulated to stick to sheet polyethylene.

2.6 DISPOSAL CONTAINERS

A. Provide six (6) mil thick polyethylene sheeting, six (6) mil leak tight polyethylene bags and other impervious containers as required by applicable regulations. All waste shall be labeled as hazardous or potentially hazardous waste unless proven otherwise by appropriate sampling and laboratory analysis.

B. All hazardous waste shipping containers shall meet applicable DOT requirements.

2.7 WARNING SIGNS AND LABELS

A. Caution Signs: To be minimum of 20 x 14 inches and includes phrase "Caution Lead Hazard, Keep Out Unless Authorized" in minimum two-inch-high letters. These shall be posted at each approach to each lead or removal Work Area or area where lead related construction hot work is conducted.

B. CAL/OSHA Lead Warning Posters shall be posted at the entrance to each Work Area:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING.

C. Labels: Hazardous waste shall be labeled according to Federal, State and Local regulations including, but not limited to, the California Code of Regulations, Title 22, Chapter 30 and the U.S. Department of Transportation 49 CFR Parts 172, 173, 178 and 179.

2.8 PERSONAL PROTECTIVE EQUIPMENT

A. Personal protective equipment shall comply with the requirements of Title 8 CCR 1532.1 Lead.

B. Minimum protective clothing and equipment for lead-related construction work shall consist of fire retardant, disposable, full body coveralls, disposable boots, gloves, or equivalent in accordance with ANSI Z41. Sleeves at wrists and cuffs at ankles shall be secure.

C. Eye protection and hard hats shall be available and worn at all times and shall conform to ANSI 87.1 and ANSI 89.1

D. The Contractor shall provide Authorized Visitors with suitable disposable protective clothing, headgear, respirators, and footwear whenever authorized visitors are required to enter the Work Area. Up to an average of ten sets per day of suitable personal protective equipment shall be made available for authorized visitors.

E. All disposable clothing worn during each work shift shall be removed prior to exiting the Work Area and shall be properly segregated and placed in container for proper waste characterization. The Contractor shall bear full responsibility for additional costs associated with waste profiling and disposal if wastes are not properly segregated.

2.9 RESPIRATORS

A. Provide workers with personally issued respiratory equipment approved by NIOSH and suitable for the lead exposure level in the Work Area. Where respirators with disposable filters are employed, provide sufficient filter for replacement as required by the worker or applicable regulation. Each respirator shall be washed whenever the worker wearing it showers or at least daily prior to storage. The following general conditions shall apply to respirator use:

1. All respirators used must be certified by NIOSH and a respirator program shall be established and implemented.

2. Respirators shall be used whenever airborne lead concentrations will exceed, or are likely to exceed, 50 µg/m3, and for any of the Trigger Tasks which have not been demonstrated to be below the PEL by initial monitoring, and for all operations involving the removal of LCP or welding on surfaces with paint or lead contamination regardless of airborne lead concentrations.

3. Prior to initial monitoring, the level of protection shall follow CAL/OSHA requirements for the specific Trigger Task. Otherwise, the respirators worn shall be selected based on measured or reasonably expected airborne concentrations of lead as follow:
   a. Half face negative pressure air purifying respirator: up to 500 µg/m3
   b. Powered air purifying respirators: up to 50,000 µg/m3
   c. Type C supplied air respirator full face piece pressure demand mode: up to 100,000 µg/m3

4. Disposable respirators are not acceptable at any time. It is always permissible to upgrade to a more protective type of respirator.

5. During all segments of LCP removal and cleanup activities and hot work on LCP coated surfaces, respirator usage shall be required of all persons within the designated Work Areas at all times regardless of airborne lead concentrations.

B. The Contractor is responsible for determination of airborne lead concentration levels for the Contractor's personnel and for providing and enforcing use of appropriate personnel respirator protection based upon airborne lead concentrations and this specification.

C. Respirators shall not be removed inside the Work Area. Workers shall proceed to the designated washing area and clean the external surface of the respirator body before removing the respirator.

2.10 TOOLS AND EQUIPMENT

A. Provide suitable tools for the removal of LCP and LCCM contamination including required HEPA exhaust systems, HEPA exhausted portable welding fume control systems, HEPA vacuums, ground fault circuit interrupters (GFCIs), ladders, scaffold, garden sprayers and portable eyewash systems.

1. All tools and equipment brought onsite shall be clean and free of lead and other hazardous material contaminants.

2. HEPA vacuums shall be labeled with a lead warning label and dedicated to LCP work to prevent commingling of lead wastes with asbestos or other wastes. HEPA filtered exhaust systems shall be DOP-equivalent tested on site to verify 99.97% effectiveness as an installed system and shall have accurate magnahelic gages to indicate filter performance while in use.

3. Provide sufficient back up equipment for use in the event of equipment failure.

4. Ensure all equipment has been fitted with any necessary feasible noise attenuators to meet occupational and environmental noise standards for building occupants.

B. Provide enough support equipment, including but not limited to, lumber, nails, hardware, shower stalls, hoses, plumbing, drain pans, sump pumps, and wastewater storage drums to construct and operate the required hand washing system and portable Washroom with showers. The number of showers shall be sufficient for the number of workmen scheduled on the job. The water hose used to connect the drain to the showers will not be used for any other purpose. The supply side water hose shall have a check valve to prevent back-flow under any circumstance.

PART 3 - EXECUTION

3.1 GENERAL

A. Public Warning and Safety Information to be Posted

1. Post signs at all approaches to the lead Work Area entrance to read "Caution Lead Hazard - Keep Out Unless Authorized." In addition, post the CAL/OSHA Lead Hazard Warning Poster at the immediate Work Area entrance.

2. A list of phone numbers for the local hospital and for emergency squad, the local fire department, a representative of the Contractor who may be reached 24 hours a day, the District's Observation Service, and Owner Representative and any other professional Consultants directly involved in the project.

3.2 GENERAL PREPARATION FOR INTERIOR LEAD REMOVAL AND LEAD-RELATED CONSTRUCTION

A. Move all non-fixed objects out of the Work Areas.

B. Cover all non-moveable objects within five (5) feet of the Work Area with six (6) mil polyethylene sheeting and seal with duct tape.

C. Shut down, lock out, isolate the HVAC systems that supply, exhaust, or pass through the lead control area. All vents and registers shall be sealed with two (2) layers of six (6) mil plastic sheeting and duct tape or equivalent.

D. Cover floors with two (2) layers of 6-mil poly.

E. Provide, at minimum, 10-foot candle illumination lighting to the Work Area.

F. Install lead caution signage at each approach to the lead related construction Work Area and lead warning signage just outside each Work Area entry/exit point.

G. When Work Area preparation is complete, notify the District's Observation Service and request an inspection. No work is to proceed in any Work Area until the general Work Area preparation materials, methods, and procedures have been inspected and approved by the District's Observation Service.

3.3 GENERAL PREPARATION OF EXTERIOR LEAD REMOVAL OR LEAD-RELATED CONSTRUCTION

A. Cordon off the Work Area extending at a minimum of 10 feet horizontally beyond the area of lead related construction with barrier tape and warning signs as specified herein.

B. Protect windows, doors, and openings within the regulated area adjacent to interior areas of the building with a minimum of one layer of 6-mil poly.

C. Where LCP or LCCM components are likely to generate airborne dust or paint chips, devise a suitable containment to contain such dust and prevent dispersal.

D. Install and secure 6 mil poly on the ground, and secure at the building perimeter (as appropriate). Extend a minimum of ten (10) feet in all directions. Extend the poly ground cover as needed to maintain all paint and debris on surfaces. Suspend exterior damaged paint removal if winds are sustained above 10 miles per hour and/or if debris cannot be maintained on poly sheeting.

E. Provide a designated entry/exit point to exterior Work Areas suitable for workers to properly decontaminate and exit from the Work Area as specified herein. Install lead caution and warning signage as specified above.

F. Notify the District's Observation Service when the Work Area is ready for inspection at the startup of each lead related construction process not previously evaluated and approved by the District's Observation Service. Lead related construction work shall not initially proceed until the Observation Service has checked and approved Work Area preparations.

3.4 WORKER PROTECTION AND DECONTAMINATION PROCEDURES

A. The Contractor shall use only workers medically qualified and trained for lead-related construction, LCP removal, hot work on LCCM surfaces, and respirator usage.

1. Medically qualified shall mean that the worker has had an occupational medical exam for lead exposure and respirator usage within 12 months of abatement start up.

2. The contents of the exam must be in conformance with Title 8 CCR 1532.1.

3. Each abatement worker shall have successfully completed formal documented training in lead hazards and lead abatement methods meeting Title 17 California Department of Public Health (DPH) requirements. Non-abatement workers performing lead-related construction work shall have documented lead training in accordance with Title 8 CCR 1532.1.

4. The Contractor's Competent Person for lead-related construction involving paint removal shall have received at least 40 hours of formal training by a Recognized Training Education Institution in lead hazards and lead abatement.

5. The Contractor shall ensure that no worker is allowed onsite to perform lead removal or lead-related construction work until the District's Observation Service has received and approved all of the worker's medical, training, and fit testing certifications.

6. Each worker and Authorized Visitor shall, upon entering the job site, enter the designated clean change room area and put on full body reusable or disposable coveralls, booties or shoe covers, respirator with HEPA filters, and gloves before entering the Work Area.

7. Each worker and Authorized Visitor shall HEPA vacuum contamination from protective clothing.

8. When exiting a Work Area, proceed to vacuum off all reusable work clothing and dispose of outer disposable protective clothing as suspect lead waste. Proceed to a designated wash area, remove, and clean the respirator and store in a clean container.

9. At the end of the workday, all workers are to do the following in addition to those procedures described above: Place disposable outer garments and shoe covers in separate labeled waste containers dedicated to PPE for proper waste characterization; remove inner disposable clothing and place in waste containers; clean protective gear including respirator, shower or wash hands and face at minimum, and put on clean street clothes in the clean room area.

10. All tools and equipment shall be decontaminated by HEPA vacuuming and wet wiping prior to being taken out of the Work Area. Tools and equipment with inaccessible internals shall be externally wet wiped, bagged and sealed prior to being removed from the Work Area.

11. Workers shall not eat, drink, smoke, or chew gum or tobacco at the work site within 20 feet of any Work Area as specified by the Owner or the District's Observation Service.

3.5 REMOVAL OF LEAD CONTAINING PAINT BY CHEMICAL REMOVAL

A. Removal of LCP using Chemical Removal system shall be approved for use by the District's Representative and District's Observation Service.

B. The Contractor shall provide additional security measures as necessary to ensure occupants cannot gain access to chemicals and chemically treated surfaces.

C. Safety data sheets for each chemical substance and product used shall be onsite at all times and available for review by the workers, the District's Representative, and District's Observation Service.

D. The Competent Person shall review the contents of the safety data sheets and the safe removal procedures with the workers prior to chemical removal.

E. Workers shall wear chemical goggles, face shields, impervious gloves, aprons, and booties over the standard protective clothing prior to starting chemical removal.

F. Stage or install a temporary emergency eyewash capable of providing a 15-minute flush within the immediate Work Area if corrosive organic or corrosive inorganic paint removal (stripping) products are used. In addition, an emergency shower shall be available onsite within 50 feet of the removal operation.

G. Chemical stripping agents (and neutralizers) shall be applied in accordance with the recommendations of the manufacturer. Remove all paint down to the bare substrate. Ensure that the chemicals used, and the associated removal methods leave a clean and smooth surface capable of accepting a suitable primer/sealer coating after final cleaning. No paint or chemical residue shall be visible on the bare metal surfaces to be welded. All chemical residues shall be removed from surface applied.

H. Containerize all paint and chemical waste in impervious containers labeled as hazardous waste.

I. Package all contaminated rags and protective equipment, and disposable cleaning items and plastic sheets in labeled impervious containers and transfer waste containers to secure waste storage units. The Contractor shall assume all such waste to be hazardous unless proven otherwise by objective waste characterization data.

J. Clean and decontaminate the Work Area in accordance with the procedures outlined herein.

K. Decontaminate all tools and equipment before removing them from the Work Area. Seal or bag-up such equipment for transfer to the next Work Area or operation.

3.6 REMOVAL OF LEAD CONTAINING PAINT BY MECHANICAL REMOVAL

A. All mechanical removal equipment and systems shall be approved by the District's Representative and District's Observation Service. Such equipment includes but is not limited to abrasive blast (all methods), needle guns, abrasive wheels, and rotopeen equipment.

B. All power tools shall be designed and equipped with effective HEPA filter exhaust systems.

C. The Contractor shall submit a separate work plan for containment of lead dust and debris emissions released by vacuum assisted power tools.

D. Work Area preparation and LCP removal shall be in accordance with the approved work plan.

E. Exterior work must include a containment or a proven local exhaust/recovery method.

3.7 CLEANING AND DECONTAMINATION OF REMOVAL WORK AREAS

A. Daily Clean up: Perform the following clean up procedures daily.

1. Clean Work Areas until they are free of loose dust and debris to the satisfaction of the District's Observation Service and/or Owner Representative using HEPA and/or wet wiping after picking up of large debris.

2. Wet debris with a fine mist of water and collect material. All material to be properly segregated, bagged in 6-mil plastic bags, sealed, and moved to a designated, secure, waste storage area for waste characterization.

3. At the end of each workday the Contractor's Competent Person shall inspect work performed that day to ensure the work has been completed and no dust or residue remains on the areas removed and/or in the Work Area. The District's Representative shall be included in that inspection process when and if they request inclusion.

B. Final Clean up and Decontamination of Work Areas: At completion of lead related construction work perform cleaning as follows:

1. Remove all visible dust, paint debris, lead containing building materials, and building materials with lead containing paint debris as specified above.

2. Clean all Work Areas where lead related work was performed by vacuuming all surfaces with a HEPA vacuum followed by wet wiping with a high phosphate (trisodium phosphate) wash or equivalent. The Contractor shall spray surfaces with a 5-10 percent trisodium phosphate (or approved equivalent) cleaning solution applied with a garden sprayer and wipe or mop surfaces with frequently changed clean towels, rags, or mops.

3. Disassemble and remove containment/barriers at each Work Area location after cleaning as specified above.

4. Place waste rags in segregated six (6) mil plastic bags, seal and store in a designated, secure, waste storage area for waste characterization.

5. The cleaning procedure used shall prevent spread of contamination and effectively clean surfaces while producing minimal waste.

6. Liquid cleaning wastes shall be filtered prior to containerizing for temporary storage pending hazardous waste characterization. Filter systems shall be able to remove particulate two microns and larger in diameter. Permits, if required, are the responsibility of the Contractor.

3.8 LEAD-RELATED CONSTRUCTION WORK

A. Where the Contractor's work requires demolition of lead containing materials, disturbance of materials coated with LCP, or removal of architectural, electrical, plumbing, or mechanical components from existing LCP coated systems, the Contractor shall take the following precautions:

1. Cordon off the work area with caution tape and lead warning signs.

2. Protect workers in conformance with Title 8 CCR1532.1.

3. Cover interior floors with two (2) layers of six (6) mil poly.

4. Place a plastic drop sheet below the area where LCP paint chips or dust is likely to be released and secure with duct tape.

5. Clean up all resulting LCP chip dust and debris by wet wiping or HEPA vacuuming before moving the drop cloth to the next area. Dispose of paint chip and contaminated cleaning materials as specified herein.

B. Where the Contractor's work involves the removal of LCP components such as painted plaster, drywall, concrete, wood, and/or materials such as resilient flooring, ceramic tile the Contractor shall take the following precautions:

1. Prepare Interior Work Areas as specified for removal.

2. Remove components using wet methods and/or HEPA vacuuming to control dust generated by mechanical cutting and/or disassembly.

3. If torch cutting is required, remove the existing paint on all surfaces at least 12 inches or more in each direction from the hot work as specified herein.

4. Clean up lead containing paint chips, dust, and debris as the removal proceeds and at the completion of work using HEPA vacuums and/or wet wiping. Clean all tools and equipment prior to removing them from the Work Area. Clean all polyethylene sheeting and horizontal surfaces prior to removing the sheeting.

5. Special precautionary controls shall be used as necessary to prevent lead dust, debris, or fume from being carried or blown out of the controlled area by wind or air currents. Torch cutting of components with inaccessible paint shall be done with HEPA filtered local exhaust ventilation to capture fumes unless monitoring data reviewed and accepted by the District's Observation Service and District's Representative indicates local exhaust is not necessary.

6. LCCM component shall be removed from the work areas. Clean up dust and debris as removal proceeds.

3.9 FINAL CLEARANCE INSPECTION AND TESTING OF REMOVAL WORK AREAS

A. Interior Clearance Inspection and Testing.

1. After the final cleanup of each Work Area by the Contractor, the District's Observation Service will conduct a visual inspection to ensure that all visible dust and debris has been removed.

2. If the results of the final visual inspection are satisfactory, the District's Observation Service may proceed to collect clearance dust wipe samples in building areas that will be reoccupied.

3. If the Work Area is not visibly clean, as determined by the District's Observation Service, the Contractor shall reclean and decontaminate the Work Area.

4. The visibly clean Work Area shall not contain surface lead contamination at or in excess of 400 micrograms of lead per square foot of surface sampled (µg/ft`) for rough exterior surfaces, 10 µg/ft^2 for smooth finish floors and 100 µg/ft^2 for windowsills. Dust wipe samples will be taken using the HUD sampling protocol by the District's Observation Service subsequent to the lead paint removal or lead related construction activities to assess adequacy of the Contractor's cleaning and decontamination procedures.

5. Dust wipe samples will be collected using commercial wipes moistened with a non-alcohol wetting agent. Areas of approximately one to two square feet will be selected from horizontal surfaces below in rooms or areas where lead related construction work or paint removal has been performed.

6. Generally, one dust wipe sample will be collected per room impacted by lead related construction work. One sample may be collected in multiple small contiguous rooms to approximately 200 square feet. Surface samples will be sent under proper chain of custody protocol to an AIHA or ELLAP accredited laboratory or equivalent.

7. All dust wipe samples will be analyzed for lead using either AAS or ICP AES for lead and results will be provided to the Contractor within two days of receipt of sample results.

8. The Contractor's cleaning and decontamination shall be deemed adequate when all collected and analyzed dust wipe sample results from the Work Area are below the following levels of lead:
   a. Smooth finished floor surfaces: 10 micrograms per square foot (µg/ft^2)
   b. Interior windowsill: 100 µg/ft^2
   c. Exterior surfaces 400 µg/ft^2.
   d. If any of the dust wipe samples exceed the clearance criteria, the entire Work Area must be cleaned and re-tested until the clearance criteria are met.

3.10 LEAD CONTAMINATION OF BUILDING INTERIOR OR ENVIRONMENT

A. In the event that removed LCCM paint, dust, or debris is not properly contained within the Work Area and thereby escapes, bypasses, or penetrates established barriers, the Contractor shall stop work immediately, notify the District's Observation Service and District's Representative immediately, and commence clean up and decontamination procedures as described herein or directed by the District's Representative.

3.11 WASTE STORAGE, SEGREGATION, AND CHARACTERIZATION

A. The Contractor shall provide for secure onsite temporary storage of LCP or LCCM related waste. Waste storage location, equipment, containers, and methods are subject to prior approval by the District's Representative.

B. All lead related waste streams and waste categories shall be considered hazardous until proven otherwise through testing by the Contractor. The Contractor shall be responsible for segregating waste into the below listed categories at minimum. If the Contractor allows different waste stream to become co-mingled, the waste will be classified as hazardous if any single component waste stream is hazardous.

   1. LCP removed by chemical stripping.

   2. Painted demolition debris to be landfilled including, plaster, concrete, wood, and metal with lead containing paint.

   3. Lead containing resilient flooring and ceramic tile.

   4. Paint (LCP) chips, dust, and debris, HEPA vacuum waste.

   5. Uncleaned plastic sheeting and tape.

   6. Disposable Protective Clothing and Equipment (PPE).

   7. Cleaning Rags.

C. The following materials are known or assumed California hazardous waste streams with respect to lead:

   1. 4" Yellow ceramic tile in the Boy's, Girl's, and Special Education Restrooms in Building F.

2. Paint chips from drywall wall and ceiling systems in the Boy's, Girl's, and Special Education Restrooms in Building F.

3. Paint chips from doors and door frames in the Boy's, Girl's, and Special Education Restrooms in Building F.

D. Intact LCP components: Architectural and mechanical equipment debris with intact LCP shall be considered hazardous until proven otherwise through testing.

E. All lead containing waste streams must be verified for federal and state hazardous waste characteristics for lead prior to landfill disposal.

F. Each lead related waste produced shall be placed in properly segregated, labeled, and sealed, impervious containers.

G. All waste containers, bags, and packaged waste shall be stored in a designated, secure, locked waste storage area and be labeled with the following information:

1. Waste Category: Lead

2. Date Accumulated: (Insert Date)

3. Name, address: (Insert Facility Name and Address)

4. Origin of waste: (Insert Waste Stream Name, i.e., Paint Chips, Vacuum Bags)

H. HEPA vacuum and wet wipe the exterior of all waste containers prior to removing them from the Work Area to the designated storage area.

I. Each category of waste, except components with intact paint, will be tested and characterized by the Contractor using one or more of the following testing protocols:

1. CAL/EPA testing protocol: Criteria
   a. Total Threshold Limit Concentration (TTLC): 1,000 ppm lead
   b. Soluble Threshold Limit Concentration (STLC): 5 ppm lead

2. Federal EPA testing protocol:
   Toxicity Characteristic Leaching Procedure (TCLP): 5 ppm lead

J. Based on the testing protocols, any waste greater than or equal to five (5) ppm lead using STLC or TCLP tests or any waste greater than or equal to 1,000 ppm lead using the TTLC test shall be considered a hazardous waste.

K. When the TTLC test result is less than 50 ppm lead, no further testing is required for that waste category sampled unless the waste stream or waste generating process changes. A minimum of four samples will be taken to represent each category of waste generated. It will be the responsibility of the District's Observation Service to ensure representative samples are taken by the Contractor from each category of segregated waste.

L. The Contractor shall package, store, handle, transport and dispose of each category of waste generated based on the testing results unless specific written direction is provided by the appropriate regulatory agency and reviewed and approved by the District's Observation Service. In all cases, the landfill shall be subject to approval by the District's Representative.

M. Upon verbal request of the District's Observation Service, the Contractor shall provide samples of lead-related waste to the District's Observation Service. The Contractor shall provide samples within full view and presence of the District's Observation Service and District's Representative upon request.

N. In the event that District's Observation Service has determined that waste is not properly segregated, additional waste testing may be conducted of the mixed waste stream. The Contractor shall be responsible for the costs associated with this additional testing.

O. The Contractor shall bear full responsibility for additional costs associated with waste disposal and characterization if waste is not properly segregated as required herein.

3.12 HAZARDOUS WASTE DISPOSAL

A. Site Storage and Handling:

1. The Contractor shall pay strict attention to the requirements of 40 CFR 262 and 265 and Title 22, Chapter 30 for the onsite handling of lead waste/debris, with special attention given to the time of storage, amount of material stored at any one time, use of proper containers, and personnel training. All waste shall be stored in secure, locked, labeled, sealed impervious containers, and not placed on the unprotected ground. All containers shall be shielded adequately to prevent dispersion of the debris by wind or rain and shall be labeled as hazardous waste. Any evidence of improper storage shall be cause for immediate shutdown of the project until a corrective action is taken.

B. Transportation and Disposal of Waste:

1. The Contractor shall arrange to have the LCP waste and debris transported from the site in accordance with the requirements of 40 CFR 263 and 264 and disposed of properly in accordance with 40 CFR 268, GISO 8 CCR Articles 40 and 41, 49 CFR Parts 172, 173, 178, and 179 and Title 22, Chapter 30, Articles 5, 6, 6.5 and 8.

2. The Contractor shall submit to the Owner and the District's Observation Service the Name, Class, and EPA I.D. Number of the waste disposal site(s) to be used for each waste category which has been determined by testing to exceed the hazardous waste thresholds provided herein.

3. The Contractor shall prepare waste shipping manifests for review by the District's Representative. Upon waste or material pickup by the selected waste transporter, manifests shall be signed by the District's Representative and copies retained to verify that all steps of the handling and disposal process have been completed properly.

4. Copies of the landfill weight tickets shall be provided to the District's Representative to verify the amount of waste disposed of at that site. The Contractor shall be responsible for all costs associated with transportation and disposal of all wastes generated at the result of this work.

C. No waste characterized as hazardous waste shall be stored onsite for more than 90 days prior to being properly transported for disposal.

D. All equipment, materials, and waste generated on this project must be removed offsite to their proper locations by the Contractor within 14 calendar days from removal and lead related construction work completion.

E. Containers to be loaded for transportation from the storage area must be removed by workers who have entered from uncontaminated areas, dressed in clean coveralls.

F. District must approve of all landfill locations in advance of transportation of waste from the project site.

3.13 STOP WORK ORDERS

A. The Owner and/or the District's Observation Service has the authority to stop work if it is determined that conditions or procedures are not in compliance with the specifications and/or applicable regulations; to the extent of potential endangerment of building users, workers, building occupants, Owner employees, the public or environment. The work stoppage shall remain in effect until conditions have been corrected and corrective measures have been taken to the satisfaction of the District's Representative and the District's Observation Service. All standby time and testing costs required to correct the above-mentioned problems shall be borne solely at the Contractor's expense. Examples of such conditions that might result in a work stoppage include but are not limited to:

1. Uncontrolled visible emissions which escape the established Work Area or breach physical protective barriers within the Work Area; and/or,

2. Ambient airborne levels of lead outside the construction area at more than 10 micrograms per cubic meters of air (µg/m3) of lead averaged over an eight-hour work period or 5.0 µg/m3 for any 24-hour period. Measurements of the ambient airborne lead levels shall be made outside the immediate Work Area and at the nearest occupied areas.

3. Unsecured Waste Storage Area and/or improper containment of lead abatement waste or LCP contamination.

3.14 CLOSEOUT

A. Prior to approval of payment request, the Contractor must provide the following information:

B. Copies of hazardous waste manifest, profile sheets and weight tickets for all hazardous waste and for all nonhazardous waste or waste recycle receipts.

END OF SECTION

Table I
Lead Containing Paint/Materials

Sample #	Material Description	Sample Location	Total Lead Content (ppm)
Pb-1	Blue paint on wood door	Custodial Room	2,400 ppm
Pb-2	Blue paint on metal door frame	Girls' Restroom	1,100 ppm
Pb-3	4" Yellow ceramic wall tile	Boys' Restroom	100 ppm
Pb-4	Off-white paint on drywall ceiling	Girls' Restroom	270 ppm
Pb-5	Off-white paint on drywall wall	Girls' Restroom	710 ppm

ppm = parts per million

ATTACHMENT A
LEAD-RELATED WORK PLAN OUTLINE

In accordance with the contract documents, Cal-OSHA Lead in Construction Standard (Title 8 CCR 1532.1) and DPH (17 CCR Division 1, Chapter 8), the Contractor is required to prepare a written, site-specific Lead Compliance Plan, and submit to the Owner for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA and DPH requirements as well as the contract documents and shall describe work procedures and control methods that will protect the District's facilities and the environment. All contractors performing lead-related construction work shall prepare plans.

I. Location of Work:

The work to be completed under this work plan will be completed at:
Building name
Location within building

II. Description of Work:

Describe the anticipated work scope, including:

Paint removal (list paints or coatings, and locations)
Paint stabilization or encapsulation (list paints or coatings, and locations)
Removal and/or replacement of lead-coated components (list components and locations)
Removal of lead containing bulk materials
Dust/residue removal or decontamination (list materials and locations)
Demolition of lead-coated components
Any other activities that will or may result in worker exposures to lead

III. Schedule:

Phase/Task	Anticipated Date(s)
Mobilization	_____
Set-up of work area(s), containments	_____
Lead-related construction	_____
Final Cleaning	_____
Visual Inspection	_____
Final Clearance (visual and air sampling)	_____
Teardown	_____
Demobilization	_____

The competent person, _____, will conduct worksite visual inspections on a daily basis, or more often as necessary.

IV. Equipment and Materials

List all equipment and materials to be used, such as the following:

HEPA Vacuums
Scrapers
Power saws
Pry bars
Cutting shears
Negative air filtration units
Manometers
Shower facilities
Airless sprayers/compressors
Cleaning detergents

Other hand tools	Solvents (must be approved by Owner)
Encapsulants/sealants	Roller/brushes
Gloves	Disposable coveralls
Respiratory protection	Eye & foot protection

V. Crew

List all workers and supervisors with emergency contact names and phone numbers. Clearly identify the supervisor and competent person who have authority for all safety and health.

VI. Control Measures and Work Practices

Describe in narrative format specific work procedures, exposure/ contamination controls, and engineering controls. This description should include, but not be limited to, the following:

Location, size, layout & detail of work	Wet methods
Negative pressure enclosure	Local exhaust ventilation for tools
Respiratory protection	HEPA vacuums
Vacuum assisted blasting	General room ventilation
Containment (i.e., poly barriers)	Interface of trades involved
Pollution control	Methods to assure safety of bldg. occupants

Removal method to reduce lead dust generation

VII. Technology to Be Used in Meeting the OSHA PEL

List all or any specialized equipment to be used to meet the PEL.

VIII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers which are anticipated for this project.

Identify the phases of the project for which respirators will be required or likely to be required.

List all personal protective equipment anticipated to be used on the project.

IX. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project.

Specify use of disposable towels, soap, hot and cold water, and other supplies.

Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site.

Describe handling or treatment of lead-contaminated solid waste and wastewater.

X. Air Monitoring Data

Identify general worker air monitoring protocols to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc.

Identify the competent person responsible for conducting personal air monitoring.

XI. Medical Surveillance Program

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions and Division I General Requirements shall be included in and made part of this Section.

B. Examine all other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.2 COMPLIANCE AND INTENT

A. This Section specifies requirements for removal of Universal Waste (UW). The Contractor shall coordinate all work with the specifications and drawings. During all work, provide monitoring and worker protective equipment in accord with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this section and all other sections of the Specifications. Where there is conflict, the most stringent requirement shall apply.

B. The work covered by this specification consists of the removal of UW including approximately twenty-two (22) fluorescent light tubes in the student restrooms of Building F.

C. All work shall comply with Environmental Protection Agency (EPA) rules and regulations governing UW: 40 CFR 273, as published in the most recent edition of the Federal Register. Additionally, all work and work-related practices shall comply with applicable federal, state, and local rules and regulations including, but not limited to, the California Department of Industrial Relations, California Code of Regulations (CCR) Title 8, Division 1, Chapter 4; Department of Health Services, CCR Title 22, Division 4.5 and California Health and Safety Code, Division 20. Where conflicts occur, compliance shall be based upon the most stringent requirements.

D. Workers involved in the removal of UW shall have received specific training on the hazards, appropriate personal protection equipment, and decontamination procedures associated with UW.

E. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits, and agreements necessary to perform the work required for UW removal and disposal in accordance with this specification.

F. Perform all work specified herein with competent persons trained, knowledgeable, and qualified in state-of-the-art techniques relating to UW removal/disposal and the subsequent cleaning of any potentially contaminated areas.

G. Perform appropriate waste profile testing for all UW waste as required by this specification, the regulations, and the selected disposal/recycling facility. All testings shall be done in the presence of the Owner or Owner’s designated representative. Chain-of-custody forms shall be provided to the Owner within one (1) day following sample delivery to the laboratory.

H. During removal activities, the Contractor shall protect against contamination of soil, water, plant life, and adjacent building areas, and shall ensure that there is no release of hazardous materials.

I. It is the Contractor's responsibility to determine the quantities of UW required for removal to facilitate the planned demolition/renovation.

J. UW removed during the abatement activities shall be handled, transported, and disposed or recycled in an approved manner complying with all applicable federal, state, and local regulations.

1.3 DEFINITIONS

A. Certificate of Disposal: The document provided to the generator certifying that the UW wastes were disposed or recycled in strict accordance with all applicable federal, state, and local regulations.

B. Chain-of-Custody: A legal concept involving documentation of the physical possession of a sample(s) from the moment it is collected, transported, analyzed, and ultimately stored in an archive.

C. Competent Person: One who is capable of identifying existing and predictable hazards and who has the authority to take prompt corrective measures to eliminate them.

D. Decontamination Area: Area which is constructed to provide the means for workers to store clothing, equipment, and other articles, and to properly remove contamination upon concluding work activities that result in exposure to these hazardous materials.

E. DOP: Dioctylphthalate or DOP-equivalent, the challenge aerosol used to perform on-site leak testing of HEPA filtration equipment.

F. Decontamination Unit: Refers to system of airlocks used to decontaminate personnel, waste bags, equipment, etc. when exiting the work area. A decontamination unit shall be set up for each containment area.

G. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically in a designated area of the work area, and including a washroom, a holding area, and an uncontaminated area.

H. HEPA: High Efficiency Particulate Air filter capable of filtering out airborne particulate 0.3 microns or greater in diameter at 99.97 percent efficiency.

I. Manifest: The document authorized by both federal and state authorities for tracking the movement of hazardous wastes.

J. Powered Air Purifying Respirator (PAPR): A full facepiece respirator that has the breathing air powered to the wearer after it has been purified through a filter.

K. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

L. Returned Manifest: An original duplicate copy of the manifest provided to the waste generator within forty-five (45) days of the transport date which acknowledges the receipt of the material at the disposal facility.

M. Visual Inspection: A visual inspection by of the work area under adequate lighting to ensure removal of all UW and that the work area is free of visible material, debris, and dust.

1.4 SCOPE OF WORK

A. Prior to removal of lighting fixtures scheduled for replacement/removal, UW such as fluorescent light tubes must be removed.

1.5 SUBMITTALS PRIOR TO START OF WORK

A. The reviews by the Owner or Owner's designated representative are intended to be only for general conformance with the requirements. The Owner or the Owner's designated representative assumes no responsibility for permits, licenses, notices, materials and methods, equipment or temporary construction required to execute the work described in this Section of the Specification or in other Sections of the Specification or in other documents included in the contract documents.

B. The following items shall be submitted to and approved by the Owner or Owner's designated representative before commencing work involving the UW and regulated waste.

1. Provide a detailed work plan for UW removal, temporary storage, and disposal. Identify vendor(s) that will be engaged for off-site disposal for approval by the Owner or Owner's representative.

2. Provide a site safety plan for UW removal prior to project initiation. The site safety plan shall include, at a minimum:
   a. List of personal protective equipment, site safety and health hazards
   b. Protocol for prevention and clean-up of UW and regulated waste spills
   c. Control methods for water leakage or discharge within and/or from the work area
   d. Materials handling procedures
   e. Contractor's internal administrative and inspection procedures
   f. Medical emergencies, earthquakes and/or fire emergency procedures
   g. Protocol for responding to complaints or questions from interested parties
   h. 24-hour emergency telephone numbers for individuals with authority to respond to emergencies

3. Provide documentation that details the workers' education and specialized training in the handling of regulated UW.

4. Submit copies of state and local licenses, evidence of Cal-OSHA registration, and permits necessary to carry out the work of this contract.

5. Provide Safety Data Sheets (SDSs)/Specification Sheets for all materials and equipment to be used for this project.

1.6 SUBMITTALS AT COMPLETION OF PROJECT

A. Upon completion of on-site work, Contractor shall provide a detailed project summary that will include each of the items listed below. The project Summary shall be submitted and approved by the Owner or Owner's representative and shall include the following:

1. Copies of the Security and Safety Logs showing names of persons entering the work areas. The logs shall include date and time of entry and exit and supervisor's record of any accident (detailed description of accident).

2. Emergency evacuations and any other safety or health incident.

3. Waste disposal documents.

4. Project Summary including, but not limited to, the following: location and approximate quantity of UW removed, waste hauler certifications, waste disposal/recycling facilities, dates of commencement and completion of on-site work.

PART 2 - PRODUCTS

2.1 SIGNS:

A. Warning signs for work areas shall be approximately 18 inches square with yellow background and 1-inch black letters. Signs shall read “DANGER – KEEP OUT – TOXIC CHEMICAL WORK AREA”.

B. Location of Signs: Provide bilingual signs at all approaches to work areas in languages used by the Contractor’s employees. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area.

2.2 PLASTIC SHEETING:

A. Use fire-retardant (FR) polyethylene (poly) film.

1. Thickness - 6-mil, minimum, NO EXCEPTIONS.

2. Flame Resistance/Flame Spread Rate <25.

3. Conforms to NFPA #701 and tested in accordance with ASTM E-84.

4. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

2.3 VACUUM EQUIPMENT:

A. All vacuum equipment used in the work area shall use HEPA filtration systems and be of the wet-dry type. The Contractor shall provide on-site independent DOP equivalent testing to document the effectiveness of the vacuum units. The test results shall be signed by the individual performing the testing.

B. HEPA-rated vacuums **shall not** be used for mercury spill cleanup unless equipped with an activated charcoal filter. Vacuum exhaust must be monitored with a direct read mercury vapor meter to verify the air quality of the vacuum discharge air.

2.4 MATERIALS AND EQUIPMENT:

A. Storage Containers:

1. All UW fluids, UW-contaminated fluids, including flush and cleaning solvents and mixtures, shall be stored in sealed DOT 17E closed top drums or other waste container approved for storage of these materials.

2. All UW solid wastes and items, including disposable items used during the work such as rags, absorbents, protective clothing, etcetera, shall be stored in sealed DOT 17C open type drums or other waste container approved for storage of these materials.

3. Any UW Article Container, other than approved DOT drums, specified in this specification, intended for storage, shall be submitted to the Owner or Owner's designated representative for approval.

B. Solvents, Cleaning Agents, and Absorbents:

1. Solvents: An appropriate solvent in which UWs are shown to be soluble in. Care should be taken to limit the complexity of the waste stream. In all cases where solvents are used during work, proper ventilation shall be provided by the Contractor to ensure that resulting fumes and/or vapors are not dispersed beyond the work area. The manufacturer's recommendations for application and requirements of Cal-OSHA shall be strictly observed.

2. Cleaning Agents: An appropriate cleaning agent in which UWs are shown to be soluble in. Care should be taken to limit the complexity of the waste stream. Numerous, non-toxic, cleaning agents shown to meet or exceed the solubility requirement above are commercially available. In all cases where cleaners are used during work, proper ventilation shall be provided by the Contractor to ensure that resulting fumes and/or vapors are not dispersed beyond the work area. The manufacturer's recommendations for application and requirements of Cal-OSHA shall be strictly observed.

3. Absorbents: "Safestep" as manufactured by Andesite of California, Inc., or approved equal.

PART 3 - EXECUTION

3.1 SAFETY PROCEDURES AND WORKER PROTECTION

A. Take all precautions and measures required to protect employees, inspection personnel, Owner's on-site personnel, and the public from exposure to regulated waste and UW solids, liquids, and vapors.

1. All personnel authorized for entry in work areas shall be instructed in the proper procedures for working with, or around, electrical hazards, regulated waste, and UW containing and/or contaminated materials.

2. All electrical equipment upon which UW related activities are to be performed shall be de-energized, locked out/tagged out, and permanently disconnected from any power source prior to the commencement of the work.

3. Consumption of food or tobacco products shall not be permitted in any of the project work areas where regulated waste, UWs, volatile solvents, and/or other hazardous materials are present. Additionally, no open flames will be permitted in these same areas. Signage to this effect shall be provided for each work area.

4. The Contractor performing the work of this Contract shall develop, together with applicable subcontractors, a contingency plan covering accidental UW spills and worker exposure to UWs. The plan shall be submitted to the Owner or Owner's designated representative prior to commencing UW-related work. The submittal shall also include a separate section to describe the hauler's spill contingency plan and avoidance procedures.

B. Work Area Protection and Marking: Prior to commencing any UW-related work activities, provide barricades and warning signs to clearly identify and effectively guard against unauthorized entry into the work areas.

1. Place barricades to maintain a minimum of 25 feet from all perimeters of the work being conducted to the barricades, where feasible.

2. All equipment such as tools, containers, etcetera, shall be confined to the work area until work is complete, containers are sealed, and equipment properly decontaminated and safely stored for transport.

C. Protective Clothing and Equipment: At all times when regulated waste and UW fluids or mixtures in any volume are not sealed in drums, containers, or electrical equipment, workers shall wear:

1. Gloves impermeable to the specific regulated waste or UWs and the solvent and/or clean up agent in use.

2. Disposable, full body suit, impermeable to both UWs and the solvent and/or clean up agent in use.

3. Appropriate eye protection to ensure that eyes are protected from liquid splatter or exposure to concentrated vapors or fumes.

4. Respiratory protection appropriate for the concentration of the hazardous material(s) and atmosphere present. Supplied air must meet requirements for Grade D air, at a minimum.
   a. Cleanup of broken mercury containing products such as light tubes and thermometers (mercury vapor producing materials) require the usage of NIOSH-approved, half-face respirators with double stack Mercury Vapor/HEPA cartridges.

D. The Contractor shall provide protective clothing, eye protection, and breathing apparatus as required for authorized inspection personnel upon request.

E. Personnel Protection and Procedures: The regulated waste or UW work area shall at no time be left unattended from the commencement of the removal work until all UWs and incidentals have been sealed in approved containers. If immediate transportation to the regulated waste or UW storage facility or disposal facility is not feasible, the work area must be secured in a manner approved by the Owner or Owner's designated representative.

1. During work procedures and at all times when regulated waste or UW containing or contaminated fluids in any volume are not sealed in drums, containers or electrical equipment, all personnel entering the regulated work area must don protective clothing and equipment. Upon exiting the work area, all disposable protective clothing shall be placed in appropriate waste storage drums and sealed, for subsequent transportation to the on-site storage facility or disposal facility.

2. Workers with cuts or scratches shall seal these wounds sufficiently to prevent accidental contact with the hazardous material(s) within the regulated work area prior to entering the regulated work area. Similarly, workers who accidentally incur minor cuts or scratches during work activities. shall immediately leave the work area, cleanse the wound with medical grade soap, and seal the wound before returning to the work area.

3.2 SPILL CLEAN-UP, CONTAINERIZATION AND MARKING

A. Clean-up of Work Area, UW Articles and Spills:

1. Equipment and Tools: After the last regulated waste or UW has been removed, and all fluids and solids cleaned from fixtures, all tools and equipment used in the work shall be decontaminated and properly stored for reuse. All tools that may have come in contact with regulated or UW at any concentration shall be thoroughly double washed/rinsed with an appropriate cleaning agent, wiped clean, and properly stored.

2. UW Contaminated articles: All exterior surfaces of equipment that may have come in contact with UW or regulated waste or contaminated solids or fluids either during work activities or due to past leaks shall be double washed/rinsed, at a minimum, with an appropriate cleaning agent and wiped clean.

3. Solid Impenetrable Surfaces: All metal surfaces and surfaces with impervious liners which have come in contact with regulated waste, UW, or UW mixtures in the course of the work or as a result of past leaks shall be thoroughly cleaned using a combination of absorbents and solvents or cleaning agents.
    a. Minimum cleaning requirements for these surfaces include removal of bulk material and two rinses with the cleaning agent of the surfaces, which came in contact with UW or UW mixtures during the work or as a result of past leaks.
    b. The work area shall be effectively ventilated during operations such that vapors used in decontamination and cleaning are not vented to occupied building areas.
    c. Upon completion of UW-related activities, if fumes or vapors are still present in levels which could impede breathing or be considered toxic under state and/or NIOSH standards, the Contactor shall provide additional ventilation to accelerate drying.
    d. An auxiliary breathing apparatus may only be used by personnel trained in the use of this equipment and experienced in conducting electrical work while wearing equipment, which could impede safe work practices.

4. Soils and Porous Materials: The U.S. EPA, Region IX, regards soil, asphalt, wood, cement and concrete as porous materials that absorb UW. Where practicable, these materials must be removed when they are within the spill or contamination boundary.

5. Decontamination Verification: Completion of decontamination activities will be verified by the Owner or Owner's designated representative.

B. Containerization and Marking:

1. All liquid generated as a result of work activities and cleanup operations shall be placed in appropriate waste containers and the containers sealed.

2. All solids such as absorbents, rags, disposable protective clothing, soils, and other incidentals shall be placed in appropriate waste containers and the containers sealed.

3. All drums shall be permanently marked as to specific contents and dated. In addition, each drum (and container) shall be marked with the standard EPA, UW, ML label (40 CFR 273) and hazardous waste label (40 CFR 262).

3.3 HANDLING AND TRANSPORTATION TO STORAGE FACILITIES

A. Drums: All closed and open top drums must be permanently sealed and marked prior to loading on transport vehicle. Filled drums shall be loaded on the transport vehicle by any of the following methods.

1. Hoist or lift truck utilizing a two-point drum lifter

2. Hoist or lift truck provided with a band-around type drum lifter

3. Lift truck lifting the drums from underneath by a pallet attached to the drum by a banding arrangement.

B. Drums shall not be lifted by the following methods.

1. Any rope, chain or cloth slings tied about the drum.

2. Placement of drums on bare lift truck forks.

3. Forcing drums between forks of a lift truck.

4. Any commercial drum lifters exerting force of the sides of a drum.

C. All drums or article containers shall be secured to the transport vehicle to prevent movement in transport.

3.4 TRANSPORTATION TO DISPOSAL FACILITY

A. General: All regulated waste and UW articles removed and all drums containing liquids, solids, and incidentals shall be transported to the off-site regulated waste/UW approved and permitted recycling/disposal facility.

1. The Contractor performing the work of this section shall be licensed for the transportation and hauling of extremely hazardous wastes. The Contractor shall provide a route plan, which clearly identifies the routes proposed while transporting UW items from the work site to the off-site facilities.

2. A minimum of two operators shall be in attendance at all times when UW items are being transported, loaded, and unloaded.

B. The rules in this section apply to each motor carrier engaged in the transportation of hazardous materials by a motor vehicle, which must be marked or placarded in accordance with DOT 177.

C. Every motor vehicle transporting or storing articles and items containing regulated or UWs or hazardous materials must be operated in compliance with the laws, ordinances, and regulations of the state jurisdiction of which it is being operated in, unless they are at variance with specific regulations of the Department of Transportation which are applicable to the operation of that vehicle which impose a more stringent obligation or restraint.

D. Unless there is no practicable alternative, a motor vehicle which contains regulated or UWs or hazardous materials must be operated over routes which do not go through or near heavily populated areas, places where crowds are assembled, tunnels, narrow streets, or alleys. Operating convenience is not a basis for determining whether it is practicable to operate a motor vehicle in accordance with this paragraph.

E. No person may smoke within 25 feet of any Contractor’s vehicle(s), which contains flammable materials (flushing solvents), or an empty tank motor vehicle, which has been used to transport flammable materials.

F. When a motor vehicle which contains hazardous materials is being fueled, its engine must not be operated.

G. Motor vehicles transporting regulated, UWs, or hazardous materials must have all containers properly secured in place to ensure that no equipment items or containers can be loose or unsafely placed into the transport vehicle. This may include chaining, roping, or strapping and winching. Any equipment, drums or other articles carried in an open, flatbed or stake type truck shall be covered with a tarp to protect it from the elements.

H. A motor carrier that transports hazardous waste must furnish the driver of each motor vehicle in which the waste is transported with the following documents.

1. A document containing instructions on procedures to be followed in the event of accident or delay. The documents must include the names and telephone numbers of persons to be contacted, the substances of the hazardous wastes being transported, and the precautions to be taken in emergencies such as fires, accident, or leakages.

2. Manifest and permit documents described in this specification and required for waste transport.

I. A motor vehicle being operated must be marked if that vehicle is transporting UWs or hazardous materials of a kind that require the vehicle to be marked or placarded in accordance with DOT 177.

3.5 UW DISPOSAL

A. The Contractor shall treat and dispose of all UW wastes collected and generated during the execution of this Contract including articles, fluids, etcetera, set forth in Section 1.04 of this specification.

B. Except as may be otherwise specifically directed by the Owner or Owner's designated representative, the Contractor shall treat and dispose of regulated and UW materials as governed by 40 CFR 273, California State regulations, local regulations, and subsequent amendments.

1. By incineration or recycling at a facility approved for such use by the U.S. EPA, and all other controlling regulatory agencies and bodies of the state, county, and municipality of that facility's location all UW fluids, flushing fluids, and other UW contaminants. If the Contractor so elects, waste contaminated solids may also be incinerated as suitable and allowed for this type of disposal.

C. All UW and regulated wastes generated as part of these operations will be disposed of by the Contractor in a legal manner.

D. The Contractor shall not sell, transfer, or recover any material from the wastes received from the state without their prior written consent.

3.6 MANIFESTS AND RECORDS

A. The Contractor shall provide the Owner or Owner's designated representative with a compliance certificate verifying that all waste received by it has been properly treated and disposed.

B. The Contractor shall provide the Owner or Owner's designated representative copies of all manifests, permits, or other documents currently in effect relating to the specific UW wastes to be transported, treated, and disposed hereunder except as otherwise stated in this Section. The Contractor shall also promptly furnish to the Owner or Owner's designated representative copies of all new or renewal permits or other documents applicable to this agreement as soon as the Contractor receives same.

C. The Contractor shall furnish complete State of California Hazardous Waste Manifests (or the Uniform Manifest – 40 CFR Parts 260, 262, 271 – if effective at time of preparation) for all UW articles to be collected from the facility at which the removal and decontamination occurred. The Owner or Owner's designated representative shall sign the manifests. These manifests shall accompany the waste loads to disposal and be properly completed by the hauler and disposal agent as required by federal and state hazardous waste management law. The final manifest shall then be returned by registered mail to the Owner or Owner's designated representative within the designated time period specified by Federal law.

D. It shall be the responsibility of the Owner or Owner's designated representative to finalize their UW records regarding the removal and final disposition of UW.

E. The contract work will not be considered complete until the Owner or Owner's designated representative receives certifications of incineration (for fluids), disposal, and/or recycling.

3.7 PLACEMENT IN STORAGE AND RECORDS

A. Transport vehicles shall be unloaded utilizing the same equipment and methods as for loading.

B. Drums and articles shall be placed in the storage facility in locations as directed by the Owner or Owner's designated representative.

1. Articles shall be placed such that ample clearance is provided around equipment to facilitate future inspection.

2. Drums shall be placed on pallets of sufficient strength.

3. Immediately following unloading of the regulated or UW transport vehicle, the cargo area shall be inspected to check for fluid leaks. If any fluids are found, the source of the leaking drum or items shall be identified and sealed. The contamination cargo area shall be thoroughly double washed/rinsed clean with absorbents, solvents, and liquid cleaner. Cleaning agents, solvents and solids shall be placed in proper drums for disposal.

C. Records: Upon completion of all regulated and UW work related activities the Contractor shall provide a complete record of such activities and storage data to the Owner or Owner's designated representative. The record shall include the following data:

1. Name of the firm performing the work of this Section and technician in charge.

2. Drum (30 or 55 gallon) or container sizes

3. Identification of contents (liquids, cleaning solvents for solids, rags, absorbents, soil, etcetera)

4. Weight in kilograms or gallons of contents of each drum or container.

5. Date placed in storage.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200, Earthwork.

B. Section 06100, Rough Carpentry.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the drawings to be salvaged or re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Conflicting requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or these specifications, the provisions of the more stringent shall govern.

1.04 SUBMITTALS

A. Refer to Section 01300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Submit certification from cement manufacturer that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ASTM C150 for Portland cement and ASTM C595 for blended hydraulic cement, whichever is applicable.

D. Submit concrete mix design for each type of concrete on the project in accordance with CBC Section 1905A.

E. Materials list: Within 35 days after award of Contract, and before any concrete is delivered to the job site, submit to the Architect a complete list of all materials proposed to be used in this portion of the work, showing manufacturer's name and catalog number of all items such as admixture, membrane, concrete mix design and the name and address of supplier of transit-mix concrete.

F. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01300.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

1.06 REFERENCES AND STANDARDS

A. California Building Code (CBC), edition as noted on drawings, as adopted by the California Division of the State Architect (DSA)

B. ACI Standards, ACI 318, ACI 301, ACI 304R, ACI 305R, ACI 306R, ACI 308.

C. ASTM C94, Specification for Ready-mixed concrete.

D. CBC, State Chapter 19A, for concrete requirements.

E. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice (latest edition).

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

E. Store cement in weather tight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.

1.08 TESTING

A. Cement and Reinforcing shall be tested in accordance with CBC Section 1916A. Testing of reinforcing may be waived in accordance with Section 1916A.4 when approved by the Structural Engineer and DSA.

B. Reinforcing to be welded, except for A706, shall be tested to determine carbon equivalent (C.E.). Cost of testing shall be borne by School District and backcharged to Contractor.

1.09 PROJECT CONDITIONS

A. Notify Architect and DSA at least 48 hours prior to placing concrete.

1.10 ADEQUACY AND INSPECTION

A. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.

B. Notify Project Inspector, Architect and DSA at least 48 hours prior to placing of concrete.

1.11 PROTECTION

A. Finish surfaces shall be protected at all times from concrete adjacent to them. Inspect forming against such work and establish tight leakproof seal before concrete is poured. Finish work defaced with concrete on surface shall be replaced.

1.12 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Form Material (Concrete Exposed to View): 5/8" (min) APA B-B Ply-form, steel or Sonotubes.

B. Form Material (Concrete concealed from View): Construction grade or better, S4S, minimum 2x.

C. Form Coating: Material which will leave no residue on concrete surface that will interfere with surface coating, as approved by the Architect.

D. Nailing blocks: 2 x 3 DF, beveled and pressure preservative treated, in accord with requirements of Section 06100.

E. Expansion Joint Material: Preformed 1/2" fiber material with bituminous binder manufactured for use as concrete expansion joint material.

F. Reinforcement Bars: ASTM A615, Grade 60, deformed, per ACI 318 Section 3.5.3.

G. Wire fabric: ASTM A185; 6x6 – W1.4xW1.4 in flat sheets (rolls not permitted), unless otherwise specified or shown.

H. Reinforcing supports: Galvanized metal chairs or spacers or metal hangers, accurately placed and securely fastened to steel reinforcement in place. Bottom bars in footings may be supported with concrete blocks.

I. Cement: Portland cement, ASTM C150, Type I or Type II, per ACI 318 Section 3.2.

J. Concrete aggregates: Conform to ASTM C33, and CBC Section 1903A.3.

K. Water: Clean and free from deleterious amounts of acids, alkalis, salts, or organic materials and per ACI 318 Section 3.4.

L. Cement dispersing admixture: Use admixture to improve placing, reduce water cement ratio, and ultimate shrinkage. Admixture shall conform to ASTM C494 and ACI 318 Section 3.6. Such admixture must receive prior approval of Architect, Structural Engineer, and DSA, and shall be included in original design mix.

M. Sheet Material for Curing Non-Colored Concrete: ASTM C171; Curing Paper, Polyethylene Film, White-Burlap-Polyethylene Sheet, or accepted equal.

N. Bonding agent for patching: "Sikadur 32, Hi-Mod" by Sika Corporation, " Burke Acrylic Bondcrete" by Burke By Edoco, or accepted equal.

O. Non-shrink grout: "Masterflow 713 Plus" by ChemRex Inc., "588 PrecisionGrout" by A.W.R Meadows, Inc., or accepted equal; premixed, non-metallic, no chlorides, non-staining and non-shrinking per CRD-C621 Corps of Engineers Specificiations.

P. Membrane curing compound: "Burke Aqua Resin Cure" by Burke By Edoco, "Sonocrete Kure 1315" by Sonneborn, or accepted equal, for exterior slabs.

Q. Hardener/Sealer: Moxie International, "Moxie 1800 Super-Admix. (For non-colored floors).

R. Non-slip grits: Aluminum oxide or emery graded from particles retained on a No. 50 sieve to particles passing a No. 8 sieve.

1. "Frictex®NS" by Sonneborn

2. "A-H Emery Non-slip" by Anti-Hydro International, Inc.

3. Accepted equal

S. Surface Treatments and Coloring Agents:

1. Hardener: Moxie International "Moxie 1500 Concrete Sealer", W.R. Meadows "Pena-Lith", or accepted equal, for non-colored exposed interior floors.

2. Carbon Black Coloring: Dispersed carbon black in liquid form; "Carblak" by Euclid Chemical Company, "Liquiblack" by Concrete Chemicals, or accepted equal.

T. Stain: L.M. Scofield Company "Lithochrome Chemstain"; color to be selected by Architect.

U. Fibers:

1. Collated Polypropylene Fibrillated Fibers:

a. "Fibermesh" fibers by Synthetic Industries

b. "ProConF" fibers by Nycon, Inc.

c. Accepted equal; Product must have current ICC Report No. to be considered equal.

2. Multifilament Fibers:

a. "Stealth" fibers by Synthetic Industries

b. “MultiMesh” fibers by Nycon, Inc.

c. Accepted equal; Product must have current ICC Report No. to be considered equal.

W. Waterstops: Greenstreak 789 B-2 rubber waterstop as detailed

X. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted) and per CBC Section 1903A.5. Not more than 15% (by weight) may be substituted for portland cement.

Y. Construction and Control Joint Material

1. 26 ga. (min. thickness) galvanized steel shapes to form tongue-and-groove joint.

2. 24 ga. Galvanized steel splice plates

3. 16 ga. Galvanized steel spikes

4. Acceptable Manufacturers:

a. “Burke Joint Key” by Meadow Burke

b. “Pro-Key” by BoMetals, Inc.

c. Accepted equal

2.02 CONCRETE DESIGN

A. Designed Strength and Classes of Concrete:

1. Class "A" concrete of 1 1/2" max. size aggregate shall have 3500 psi 28 day strength and 0.55 maximum water-cement ratio. Use in footings and other concrete of like nature where minimum thickness equals or exceeds 8". Class B concrete may be used in lieu of Class A at Contractor’s option.

2. Class "B" concrete of 3/4" max. size aggregate shall have 4000 psi 28 day strength and 0.45 maximum water-cement ratio. Use in concrete less than 8" min. thickness including interior floor slabs and curbs. In all interior slabs provide Moxie 1800 Super-Admix and omit air entrainment (ASTM C26) and water-reducing (ASTM C494) admixtures.

3. Class "C" concrete of 1" max. size aggregate shall have 3000 psi 28 day strength with maximum water-cement ratio of 0.55. Use in exterior slabs on grade, including walks (non-structural concrete). Provide polypropylene fibers in all exterior slabs, walks, stairs, ramps and other exposed flatwork at a rate of 1.5 pounds per cubic yard. (Use multifilament fibers in concrete containing coloring).

B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143. Slumps as follows:

Class "A", 4" plus or minus 1".
Class "B", 4" plus or minus 1".
Class "C", 4" plus or minus 1".

C. Mix Design: All concrete used on this work will be designed for strength in accord with provisions of CBC, Section 1905A.3. All mixtures will be designed by Laboratory selected by School District and all cost of designing mixes will be borne by School District. (Should Contractor desire to pump concrete, a modified Class "B" mix will be designed by Laboratory at School District expense). Fly ash may be used in Concrete to improve workability in amounts up to 15% of cement weight.

D. Fibers: Design mixes applicable shall include fibrillated polypropylene fibers in amounts of not less than 1.5 pounds, nor more than 1.6 pounds, of fiber per cubic yard; 1 pound per cubic yard of multifilament fibers in concrete containing coloring.

E. Carbon Black Coloring: Tone down exterior concrete slabs, walks, ramps, stairs (including bleachers) and other exposed flatwork to eliminate glare, using dispersed carbon black in liquid form at rate of not more than 3 lbs per cubic yard of concrete. Exact amount used will depend on color of cement, and shall be as directed. Add color to mix in accord with manufacturer's printed instructions.

2.03 MIXING OF CONCRETE

A. Conform to requirements of CBC, Chapter 19A.

B. All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogenous; mixer must be discharged completely before the mixer is recharged.

C. Concrete shall be Ready-mix Concrete: Mix and deliver in accordance with the requirements set forth in ASTM C94. Batch Plant inspection may be waived in accordance with CBC Section 1704A.4.4 when approved by Structural Engineer and DSA.

1. Licensed Weighmaster to positively identify materials as to quantity and to certify to each load by ticket. Approved inspector of the testing laboratory shall check first batching at start of work and furnish mix proportions to Weighmaster.

2. Ticket shall be transmitted to Project Inspector by truck driver with load identified thereon. Inspector will not accept load without load ticket identifying mix and will keep daily record of pours, identifying each truck, its load, time of receipt and approximate location of deposit, and will transmit two copies of record to DSA.

3. A minimum of one set of three cylinders shall be taken and tested for each 50 cubic yards of concrete or fraction thereof. (See also Article 3.15.B.).

4. **At end of project, Weighmaster shall furnish affidavit to DSA on form satisfactory to DSA, certifying that all concrete furnished conforms in every particular and to proportions established by mix designs. Any cost involved in this modified procedure will be paid by School District and backcharged to Contractor.**

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect and verify that installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. In event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

D. Inspection of reinforcing steel welding shall be per CBC Section 1704.4.2.

E. Project inspector shall maintain placing record per CBC Section 1704A.4.7.

3.02 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

C. Maintain partition in fully open position completely covered with protective materials until final acceptance by the Architect.

D. Exposed finishes shall be free from scratches, dents, permanent discolorations and other defects in workmanship or material.

3.03 WORKMANSHIP

A. Form to produce smooth concrete - straight, plumb and true to plane. Concrete out of line, level or plumb will be rejected.

3.04 CONSTRUCTION

A. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which have warped or delaminated, or require more that minor patching of contact surfaces, shall not be reused.

B. Build forms to shapes, lines, grades and dimensions indicated. Construct formwork to maintain tolerances required by ACI 301. Forms shall be substantial, tight to prevent leakage of concrete, and properly braced and tied together to maintain position and shape. Butt joints tightly and locate on solid backing. Chamfer corners where indicated. Form bevels, grooves and recesses to neat, straight lines. Construct forms for easy removal without hammering, wedging or prying against concrete.

C. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.

D. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.

E. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.

F. Brace, anchor and support all cast-in items to prevent displacement or distortion.

G. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.

H. Slabs, Walks and Curbs:

1. Expansion Joints: Install at locations indicted, and so that maximum distance between joints is 40' for exterior concrete unless otherwise shown.

2. Slab Control Joints: Install specified keyed-type joint material for all interior slabs and elsewhere as indicated on Drawings. Maximum area between joints is limited to 225 square feet, maximum length between joints is limited to 16 feet, aspect ratio of length to width is limited to 1.25 to 1. Contractor can set joint spacing within above limits to suit placing schedule except that all joints specifically shown on structural drawings must be set as so located.

   a. Where joint spacing is not shown, Contractor will submit proposed locations to suit slab-on-grade detail shown on Structural Drawings.

3. Isolation Joints: Install #30 roofing felt between walls and exterior slabs or walks so that paved areas are isolated from all vertical features, except if expansion joints are specifically indicated.

4. Exterior Slabs, Walks: Install construction joints @ 10’-0” o.c. as minimum, both directions, unless shown otherwise on plans.

3.05 FORM COATING

A. Before placement of reinforcing steel, coat faces of all forms to prevent absorption of moisture from concrete and to facilitate removal of forms. Apply specified material in conformance with manufacturer's written directions.

B. Before re-using form material, inspect, clean thoroughly and recoat.

C. Seal all cut edges.

3.06 CLEANING

A. Remove all wood chips, sawdust, dirt, loose concrete and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove all water from excavations.

3.07 PLACEMENT

A. Reinforcement shall be accurately placed at locations indicated on the drawings within required tolerances and providing required clearances. Reinforcement shall be secured prior to placement of concrete such that tolerances and clearances are maintained. Coverage shall be in accordance with CBC Section 1907A.

B. Clear distance between parallel bars in a layer shall be not less than 1", the maximum bar diameter nor 1½ times the maximum size of the coarse aggregate. Keep man on job to maintain position of reinforcing as concrete is placed. Reinforcement must be in place before concreting is begun. Bar laps may be wired together; lace fabric splices with 16 ga. wire. Splice reinforcing steel (#6 and smaller) with minimum lap of 69 bar diameters in concrete, 75 bar diameter lap in CMU, unless otherwise shown on Structural Drawings and splice wire fabric minimum of two mesh widths and a minimum of 12 inches. Embed fabric in center of slabs, unless otherwise shown. Install dowels as shown on Drawings. All construction joints in concrete shall have dowels of size and spacing shown, or as approved by Architect.

3.08 CLEANING

A. Reinforcement and all other embedded items at time of placing concrete to be free of rust, dirt oil or any other coatings that would impair bond to concrete.

3.09 WELDING

A. Welding of reinforcing bars shall be performed only where indicated on plans and in compliance with AWS D1.4. and CBC Section 1903A.4 and ACI 318 Section 3.5.2. All welding of reinforcement is to be inspected in accordance with CBC Section 1704A.4.2.

3.10 INSPECTION

A. Approval of reinforcing steel, after installation, must be received from Project Inspector. Architect, Structural Engineer and DSA must be notified 48 hrs. in advance of beginning of concrete placement operations. Inspection of welding will be done by laboratory and all costs in connection with this inspection will be paid as provided for in General Conditions, except that cost of all welding inspection required beyond 3 days total of shop and field welding will be backcharged to Contractor.

3.11 PLACING OF CONCRETE

A. Transportation: Handle from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients; deposit as nearly as practicable in final position to avoid re-handling or flowing; partially hardened concrete must not be deposited in work. Concrete shall not be wheeled directly on top of reinforcing steel.

B. Placing: When once started, carry on concrete pouring continuously until section is complete between predetermined construction joints; prevent splashing of forms or reinforcement with concrete, remove such accumulation of hardened or partially hardened concrete on forms or reinforcement above concrete already in place before work proceeds; free fall of concrete not to exceed 6'-0"; if necessary, provide openings in forms to reduce fall.

C. Remove form spreaders as placing of concrete progresses.

D. Place footings as monolith in one continuous pour.

E. Keep excavations free of water. All concrete shall be placed in dry excavations.

F. Compacting: All concrete shall be compacted by mechanical vibrators. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrating shall not be applied to concrete which has already taken initial set nor shall it be

continued so long as to cause segregation of material.

G. Concrete Slabs (Interior and Exterior): All slabs shall be laid to required line and grades with accurate, firm screeds. Subgrade shall be thoroughly watered the night before laying and sprinkled the following day, immediately in advance of placing.

H. Depress areas of interior floor slabs where required for urinals, floor drains, door frames and tile and as noted on plans. Slope, where indicated on plans, to be in subfloor.

I. Hot Weather Concreting: Comply with ACI 305R-99. Concrete shall not exceed 85 ºF at time of placement. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface drying. Concrete shall be kept wet continuously after placement until implementation of curing procedure in accordance with this specification.

J. Placing in Cold Weather: Protect from frost or freezing. No antifreeze admixture permitted. When depositing concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F when cement is added. Concrete shall be maintained at temperature of at least 50 degrees F for not less than 72 hours after placing. See ACI 306-02 and CBC 1905A.12 for additional requirements.

K. Horizontal Construction Joint: Comply with CBC Section 1906A.4. Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting. If contact surface becomes coated with earth, sawdust, etc., after being cleaned, rechip entire surface.

3.12 CONCRETE FINISHES

A. Cement Slab Finish: Tamp slab surface with grid tamper and strike off to firm screeds; following stiffening of concrete, float to true surface and finish as follows:

1. Interior Slabs, Smooth Finish (typical finish): Two steel troweling operations; long-handled or Fresno trowel not permitted; first troweling performed when concrete will support operator on kneeboards; second troweling to follow concrete initial set for burnished surface free from trowel marks, depressions, ridges or other blemishes, and shall be acceptable to finish flooring applicators. Tolerance for flatness shall be 1/8" in 10'. Repair slabs which exceed tolerance for flatness by grinding down high spots and filling low spots with a compound approved by finish flooring contractor.

2. Exterior Concrete Walks: Two steel trowelings as called for above; follow second troweling with stiff broom, brooming perpendicular to direction of traffic to form non-slip surface.

B. Joints: Mark off exposed joints, where indicated, with 1/4" radius edging tool. Markings to be clean cut, straight and square with respect to border. Tool edges of exposed expansion and contraction joints, border edges, and wherever concrete adjoins other material or vertical surfaces.

C. Hardener: Harden and dustproof all exposed interior concrete floors except colored concrete, using Moxie 1500 Concrete Sealer. Hardener shall be shipped to job in unopened containers bearing manufacturer's labels. Apply in strict accord with manufacturer's printed instructions.

D. Non-Slip Grits: Apply to all interior concrete floors scheduled to be exposed per manufacturer's reccomendations.

3.13 CURING

A. Concrete in Forms: Keep forms and top on concrete between forms wet continuously until removal of said forms; maintain exposed concrete in wet condition for 14 days after removal of forms.

B. Interior Slabs shall be moist-cured for 7 days after placement

C. Interior Slabs Scheduled to Receive Rubber, Sheet Vinyl, Carpet or Vinyl Composition Tile: Same as item "B" above. Notify Moxie 1800 representative at least 14 days prior to commencement of testing.

D. Interior Slabs Scheduled to Receive Ceramic Tile: No curing compound.

3.14 REMOVAL OF FORMS

A. Remove without damage to concrete surfaces.

B. Sequence and timing of form removal shall insure complete safety of concrete structure.

C. Forms shall remain in place for not less than the following periods of time. These periods represent cumulative number of days during which temperature of air in contact with concrete is 60□ F and above.

1. Vertical forms of foundations, walls and all other forms not covered below: 7 days.

2. Slab edge screens or forms: 5 days.

3. Concrete columns and beam soffits: 14 days.

3.15 CONCRETE TESTING

A. Comply with CBC Section 1903A, 1905A.3, 1916A and as specified in B. below. Costs of tests will be borne by School District.

B. Three identical cylinders shall be taken and tested for each 50 cu. yd. of concrete, or fraction thereof of each mix being placed each day. Cylinders shall represent as nearly as possible the batch of concrete from which they are taken; one shall tested at the age of 7 days and the other at 28 days. Cylinder for 28-day test will not be broken if cylinder for 7-day test meets 28 day strength. Hold third cylinder for test at 56 days if test at 28 days is not at specified strength.

C. Cost of re-tests or coring because of understrength, questionable or defective concrete will be paid by School District, but deducted from Contract price.

3.16 DEFECTIVE CONCRETE

A. As directed by Architect, remove defective concrete from site, or cut out and repair before concrete is thoroughly dry. No patching is to be done until surfaces have been examined by

Architect.

B. Permission to patch any area shall not be considered waiver of right to require removal of defective work, if patching does not, in opinion of Architect, satisfactorily restore quality and appearance of surface.

C. Defective concrete is:

1. Concrete not meeting specified 28-day strength.

2. Concrete which contains rock pockets, voids, spalls, cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.

3. Concrete which is incorrectly formed, out of alignment or not plumb or level.

4. Concrete containing embedded wood or debris.

5. Concrete having patched voids which were not filled under Architect's direction.

6. Concrete not containing required embedded items.

D. Patching: REPAIRS TO DEFECTIVE CONCRETE INVOLVING STRUCTURAL STRENGTH IS SUBJECT TO APPROVAL OF ARCHITECT AND DSA.

1. Chip away minor defective areas to depth of at least 1" with edges perpendicular to surface. Wet area to be patched and space at least 6" wide entirely surrounding it to prevent absorption of water from patching mortar.

2. Coat with specified bonding agent. Apply patching mortar immediately thereafter. Patching mortar shall consist of 1 part cement to 3 parts fine aggregate mixed with water to consistency as dry as possible consistent with handling and placing.

3. Thoroughly compact mortar by ramming into place and screed off so as to leave patch slightly higher than surrounding surface. Leave undisturbed for 1 to 2 hours to permit initial shrinkage before final finish. Finish to match adjoining surface. Keep wet for at least 7 days. Provide protective covering such as burlap or fiberboard so that patch area is kept continuously damp.

4. In general, minor defective work may be repaired by use of cement mortar, as specified above, but if defects are serious, or affect strength of structure, or, if patching does not satisfactorily restore quality and appearance of surface, complete removal and replacement of concrete may be ordered.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Thin Brick masonry veneer units.
B. Related Sections:
   1. Section 01 31 19 - Project Meetings
   2. Section 01 33 00 - Submittals
   3. Section 03 00 00 – Miscellaneous Concrete
   4. Section 06 10 00 - Rough Carpentry
   5. Section 07 62 00 - Sheet Metal Flashing and Trim
   6. Section 07 92 00 - Joint Sealants
   7. Section 09 24 00 - Cement Plaster
   8. Section 09 29 00 - Gypsum Board

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. A 525 – Steel Sheet Zinc-Coated – hot dip galvanized
   2. C 33 - Specification for Concrete Aggregates.
   3. C 67 - Test Methods of Sampling and Testing Brick and Structural Clay Tile.
   4. C 79 – Gypsum Sheathing board
   5. C 270 - Specification for Mortar for Unit Masonry.
   6. C 578 – Preformed Cellular Polystyrene Thermal Insulation
   7. C 482-02 Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement
   8. C 270 - Specification for Mortar for Unit Masonry.
   9. C 1019 - Method of Sampling and Testing Grout.
   10. C 1088 - Standard Specification for Thin Veneer Brick Units Made from Clay or Shale.
   11. C 1325 – Standard specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
   12. C 1780 – Standard Practice for Installation Methods for Adhered Manufactured Stone Masonry Veneer.
B. ANSI
   1. A108.11 Installation of cementitious backer units.
   2. A108.13 Installation of waterproof membranes for thin-set brick.
   3. A118.1 Dry-set Portland cement mortar.
   4. A118.4 latex Portland cement mortar.
   5. A118.9 Cementitious backer units.
   6. A118.10 Waterproof membranes for thin-set brick.
   7. A136.1 Organic Adhesives, Type I and Type II
C. International Building Code (ICC), adopted addition.
D. Building Code Requirements and Specification for Masonry Structures (TMS 402/602), adopted addition.
E. PCA Plaster and Stucco Handbook, latest edition

F. TCNA Handbook for Ceramic, Glass, and Stone Tile Installations, latest edition.
G. Masonry Veneer Manufacturers Association Installation Guide and Detailing for Compliance with ASTM C1780, latest edition

1.03 SUBMITTALS

A. Submit under provisions of Section 01 33 00.
B. Product Data, and Evaluation Reports as required for installation.
C. Shop Drawings: Include elevations of each wall indicating type and layout of units.
D. Samples: Include samples of stretcher units in sufficient quantity to illustrate color range and texture.
E. Test Reports from an independent testing laboratory showing compliance with applicable specifications.
F. Provide manufacturer's specification, data, and installation for review prior to fabrication of work.
G. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect

1.04 QUALITY ASSURANCE

A. Continuous Inspection:
    1. Employ a qualified masonry inspector for continuous inspection of the masonry work. Acceptance by a State or municipality having a program of examining and certifying masonry inspectors will be considered adequate qualifications. The masonry inspector shall be at the site during all masonry construction and perform the following duties:
        a. Review Drawings and Specifications and meet with the CONTRACTOR to discuss requirements before work commences.
        b. Before masonry work commences, CONTRACTOR and the Contractor's Quality Control Representative shall attend meeting with ENGINEER to review the requirements for surveillance and quality control of the masonry work.
        c. Check brand and type of cement, lime (if used), and source of sand.
        d. Ensure that the backing is continuous, rough, and moisture resistant to receive units.
        e. Observe field proportioning of mortar. Visually check aggregate to determine uniformity of grading, cleanliness, and moisture.
        f. Ensure that joints are full of mortar and kept tight during work.
        g. Continuously observe placing of grout.
        h. Perform or supervise performance of required sampling and testing.
    2. Keep complete record of inspections. Report daily to the Contractor's Quality Control Representative the progress of the masonry inspection.
B. Mock-up:
    1. Prior to starting construction of masonry, construct minimum 4 foot square mock-up.
    2. Use accepted materials, containing each different kind and color of brick masonry units to illustrate wall design.

3. Show color range, texture range, bond, mortar color, joint tooling, critical design details and quality of workmanship.
4. Masonry construction may not proceed until the Architect./ Engineer approves mock-up.
5. When not accepted, construct another mock-up.
6. When accepted, mock-up will remain intact during construction, will be the standard of comparison for the remainder of masonry work.
7. Upon completion and acceptance of Project, dispose of mock-ups in legal manner at offsite location.

C. Pre-installation Conference: Conduct as specified in Section 01 31 19.
D. Certification: Furnish manufacturer's certification that clay thin brick units provided meet or exceed the requirements of this specification.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units above ground to prevent contamination by mud, dust or other materials likely to cause staining or other defects.
B. Cover and protect masonry units from inclement weather to maintain quality control and physical requirements.
C. Transport and handle brick masonry units as required to prevent discoloration, chipping, and breakage.
D. Locate storage piles, stacks, and bins to protect materials from heavy traffic.
E. Remove chipped, cracked, and otherwise defective units from jobsite upon discovery.

1.06 PROJECT CONDITIONS

A. Cold Weather Requirements:
   1. In accordance HCM Section 2104.3.
   2. Provide adequate equipment for heating masonry materials when air temperature is below 40 degrees Fahrenheit (4 degrees Celsius).
B. Hot Weather Requirements:
   1. In accordance with HCM Section 2104.4.
   2. When ambient air temperature exceeds 100 degrees Fahrenheit (38 degrees Celsius), or when ambient air temperature exceeds 90 degrees Fahrenheit (32 degrees Celsius)and wind velocity is greater than 8 miles per hour, implement hot weather protection procedures.
   3. Wet mortar board before loading and cover mortar to retard drying when not being used.
   4. Do not spread mortar beds more than 48 inches (1.22 m) ahead of placing masonry units.
   5. Place masonry units within one minute of spreading mortar.

C. Wetting of Brick: shall be required at the time of laying if the unit's initial rate of absorption (IRA) exceeds 30 grams per 30 square inches per minute or 1 g/ 645mm$^{2.}$

ADHERED THIN BRICK
VENEER UNITS

Section 04 21 50
21-32-051

PART 2 PRODUCTS

2.01 THIN BRICK MASONRY UNITS

A. Manufacturers:
   1. Interstate Brick/HC Muddox: www.interstatebrick.com; www.hcmuddox.com

B. Type: ASTM C 1088, Grade Exterior, Type TBS thin veneer brick.

C. Surface Texture: To be selected by Architect/ENGINEER from manufacturer's full range of available textures.

D. Colors:
   1. Color as selected by Architect/Engineer from standard colors.

E. Size: 1/4 in. thick x 4 in. high x 8 in. long, unless otherwise **indicated on the drawings**.

F. Special Sizes and Shapes: As required for window and door locations and custom sills where indicated, corners, and other special applications to minimize cutting.

G. Substitutions: None allowed

2.02 SETTING BED MORTAR

A. Site mixed: Meet requirements of ASTM C270 Type N or Type S, or comply with ANSI A118.4 or A118.15. ASTM C270 Type S not for use with cement board substrate.
B. Preblended: Meet requirements of ASTM C1714/C1714M Type S, or comply with ANSI A118.4 or A118.15. ASTM C270 Type S not for use with cement board substrate.
C. Modified mortar for use with cement board substrate: comply with ANSI A118.4 or A118.15
D. Mortar Bed Installations: For mortar setting bed (scratch) or brown coat as the substrate for thin brick work; work to conform to ANSI A108.1. or TMS 402/602.
   1. Portland Cement Mortar
      a. Premixed: Type S premixed mortar or by proportions 1 part cement; ½ part lime and 4½ parts sand.
      b. "As specified by Architect", and meeting the following minimum requirements:
         i) Bond Strength (TMS 402/602)……..…..100 psi (0.69 MPa) min.
   2. Latex-Portland Cement Mortar should conform to the requirements of ANSI 118.04 or A118.15
      a. Premixed mortar or by proportions recommended by the manufacturer of the latex polymer.
      b. "As specified by Architect", and meeting the following minimum requirements:
         i) Compressive Strength (ANSI 118.4)……2500 psi (17.24 MPa) min.
         ii) Bond Strength (ANSI 118.4)…….150 psi (1.03 MPa) min.

2.03 POINTING MORTARS

A. Mortar used to grout or tuck-point mortar joints (sometimes called grouting mortars) between thin brick units after they are adhered to the substrate wall. Mix by proportion: 1 part Portland cement (ASTM C150); 1 part hydrated lime (ASTM C207); 6 parts sand (ASTM C144), or Modified Epoxy emulsion mortar/grout conforming to ANSI 118.07.
   1. Site mixed: Meet requirements of ASTM C270 Type N or Type S.
   2. Preblended: Meet requirements of ASTM C1714/C1714M Type S.

2.04 WEATHER RESISTIVE BARRIER (WRB)

A. Sheet goods: For exterior wall (not roof) applications. compatible with cementitious plaster and mortar capable of bond capacities of 50 psi (0.34 MPa) shear and tension bond
B. Elastomeric liquid/fluid applied: compatible with cementitious plaster and mortar capable of bond capacities of 150 psi (1.03 MPa) shear and tension bond.

2.05 DRAINAGE LAYER

Sheet or roll goods comprised of woven plastic strands, plastic strand mesh, profiled (ribbed, or dimpled) plastic sheeting, all faced with filter fabric. Alternatively, the drainage layer may be created with a filter membrane with dimples, or “buttons”, other protrusions bonded to the surface which create a 1/16” (1 mm) (minimum) air space, or other suitable material to provide a separation that allows water to drain out of the wall system.
A. HydroGap® by Benjamin Obdyke, or equivalent
B. Mortairvent® by Advanced Building Products, or equivalent
C. Sure Cavity™ by MTI, or equivalent

2.06 LATH (FURRED)

A. 3/8” (9.5mm) dimples or ribs, 3.4 lb./yd^2 (1.9kg/m^2) self-furring expanded galvanized metal lath – ASTM C847
B. 1/4” (6.3mm) dimples or ribs, 2.5 lb/yd^2 (1.4kg/m^2) (or heavier) self-furring metal lath – ASTM C874
C. Welded wire lath – ASTM C933
D. Proprietary integral woven fiberglass lath and profiled drainage membrane – See 2.08-F.

2.07 FLASHING

A. Corrosion resistant plastic, copper, stainless steel, painted metal, coated metal as shown on the drawings. See section 07 62 00 for additional information.

2.08 ACCESSORIES

A. Weep screeds: Corrosion resistant with 3.5” (89mm) (minimum) vertical attachment flange (that terminates behind WRB)
   1. Metal weep screed: not less than 26 gage; .0179 inches (0.45mm)

2. Plastic weep screed: not less than 0.05 inches (1.3mm)

B. Casing beads: Corrosion resistant
   1. Metal weep screed: not less than 26 gage; .0179 inches (0.45mm)
   2. Plastic weep screed: not less than 0.05 inches (1.3mm)

C. Elastomeric sealants. Sized for calculated movement. Section 07 92 00

D. Fasteners: ASTM C1063
   1. For steel studs: corrosion resistant screws; coated or bi-metallic (mild [drill] tip with stainless threaded shank), for fastening drainage plane material and lath material to substrate wall; rated for resistance to moist environments. Penetrate stud to expose 3 full threads through steel studs
   2. For wood studs: corrosion resistant staples, corrosion resistant roofing nails, or corrosion resistant screws and washers, all of sufficient length to penetrate a minimum of ¾" into wall framing members
   3. For concrete or CMU: corrosion resistant concrete screws (with 1¼" minimum penetration into sound substrate) or corrosion resistant powder actuated fasteners (with 1" minimum penetration into sound substrate)
      a. Follow fastener manufacturer's recommendations for installation into CMU
   4. Fasteners intended to secure lath shall have sufficiently large heads or added corrosion resistant washers large enough to not pull through the lath.

E. Fluid applied bond coat – used on the face of rigid insulation

F. Proprietary Lath Systems – follow manufacturer's recommendations for installation
   1. Punched galvanized sheet metal: TABS II or equivalent
   2. Thermoset reinforced plastic: Speedymason or equivalent
      a. Mortar set
      b. Peel n' stick
   3. Profiled expanded rigid foam: Brickwebb by Old Mill or equivalent.
   4. Fiberglass woven lath bonded to profiled plastic drainage membrane
      a. Delta-Dry and Lath, by Dorken, or equivalent

G. Proprietary MVIS systems: exterior wall assembly system applied to clean and sound exterior substrate surfaces that has compatible components comprised of: liquid/fluid elastomeric WRB membrane, cementitious plaster substrate, setting/bonding mortar, and pointing mortar (grout) systems designed specifically for adhered exterior masonry veneers, including thin brick. Not applicable where it would be applied directly to a drainage layer.
   1. Laticrete MVIS or equivalent.
      a. 3-part system: fluid WRB + masonry veneer mortar + pointing mortar. Used for thin or thick set applications
      b. 4-part system: fluid WRB + premium mortar bed + masonry veneer mortar + pointing mortar. Used in lieu of stucco substrates

2.09 STUCCO – SEE SECTION 09 24 00 CEMENT PLASTERING

PART 3 EXECUTION

3.01 VENEER SUBSTRATE SURVEY

A. Survey condition of substrate wall or backing to receive thin brick and report all non-conformance issues, including but not limited to: flatness, plumb, alignment, and location. Report all pertinent issues to the General Contractor prior to initiating any work.

3.02 VENEER SUBSTRATE PREPARATION

A. Concrete, CMU, Cement Backer Board, and Stucco
   1. Remove all deleterious substances (form release, curing compounds, paint, graffiti, etc.)
   2. Wash surface and allow to dry
   3. Cleaning may be waived/eliminated where proprietary lath systems are used, pending acceptance of Architect and lath system manufacturer.

B. Wood sheathing.
   1. Prepare to receive veneer assembly by properly setting all protruding fasteners and fixing fasteners that have punched through the exterior surface of the sheathing.
   2. Remove all deleterious materials from the surface of the sheathing.

C. Prepare substrate surface to receive adhered thin brick as noted above or by any other suitable and approved means and methods that will ensure adequate bond and durability if the thin brick installation. Submit proposed means and methods for review and receive approval prior to initiating any work..

3.03 CONFIRMATION OF MASONRY LAYOUT

A. Prior to installation of thin brick, layout (dry) coursing to fill surface and note any adjustments that are necessary to produce the desired look, eliminating units that are less than 1/2 of the full unit width. This may require adjusting the location of head joints and using 3/4 length (approx.) units to maintain the desired bonding pattern.

B. Adjust joint widths within established tolerances to accommodate brick tolerances.

C. Adjustments to layout, including but not limited to partial brick units and joint sizes must be approved by the Architect prior to installation.

3.04 EXTERIOR THICK SET APPLICATION FOR UNEVEN SUBSTRATES (CONCRETE, CMU AND UNEVEN WOOD SHEATHING)

The following guidelines are intended for exterior application over somewhat uneven substrates or when using thin brick with undulating/uneven back surfaces or thin bricks that vary in thickness.

A. Protect adjacent construction with appropriate means from mortar droppings and other effects of laying of brick masonry units.

B. Install flashing at the perimeter of thin brick veneer wall assembly, around openings, and at base of veneer, integrated with the WRB to prevent the moisture from entering the building and to transmit the moisture to the outside of the wall. Install weeps (weep screeds) at the bottom of the walls, integrated with the WRB to transmit the moisture to the outside face of the wall. Secure flashings with fasteners.

C. Install two layers of WRB sheet or roll goods over the substrate wall, in shingle fashion, starting at the bottom of the wall. The laps should be 2 in. (51 mm) minimum for horizontal laps and 6 in. (152 mm) minimum for vertical laps. Stagger laps in each layer, in shingle fashion. Secure in place with mastic, adhesive or fasteners. WRB may be reduced to a single layer where drainage layer is used; increase horizontal laps to 3” (76 mm) for single layer WRB sheet goods.
   1. Alternatively, apply liquid or fluid WRB to clean, sound substrate materials.

D. Install optional (recommended) drainage layer over WRB. Avoid creating dams or terminations that would impede the flow of water and moisture out of the wall, directing it to the exterior surface. Secure drainage layer with fasteners.
   1. See 3.03-E.1 for alternative.

E. Where exterior insulation is intended, rigid insulation should be chosen, and it should be installed over the optional but recommended drainage layer, secured in place with appropriate fasteners.

F. Install metal lath complying with ASTM C847 on the substrate material, furred a minimum of ¼" (6 mm) off the face of the substrate material. Self-furring lath may be used (recommended). Refer to ASTM C1063 for installation of metal lath for Portland cement plastering applications. Secure lath with fasteners. The maximum horizontal spacing for the fasteners is 16 in. (406 mm) o.c. and maximum vertical spacing for fasteners is 6 in. (152 mm) o.c.
   1. Alternative: drainage layer and lath can be provided by proprietary system of lath combined with a drainage layer as noted in 2.04.

G. Apply ½" to 1" (13 mm to 25 mm) thick cementitious plaster (stucco) scratch coat on clean and dust-free substrate, using Type S mortar, working into lath to completely embed lath into cementitious plaster with at least ¼" coverage on the back of the lath. Mortar per 2.02-D-1 above. Scarify surface while moist. Apply ¾" to 1¼" (19 mm to 32 mm) thick cementitious plaster (stucco) over rigid insulation, where occurs.
   1. Contiguous areas of cementitious plaster (stucco) bounded by joints or edges of the plaster should not exceed 144 sq ft (13.4 sq. m), with joint spacing not to exceed 18 feet (5.5 m), and with the aspect ratio of areas bounded by joints or edges of the plaster should not exceed 1.5:1.0.

   Cure scratch coat at least 24 hours prior to the application of subsequent coats. If surface dry, pre-wet surface prior to applying the setting (bonding) mortar. See Section 09 24 00 for additional information.

H. Spread brick setting (bonding) mortar bed onto the clean and dust-free substrate using the flat side of a trowel and comb using a notched trowel (3/16" to ¼" [5 mm to 6 mm] deep notches) to obtain an even setting bed. Use Type S polymer modified mortar (Latex-Portland Cement Mortar per 2.02-D-2 above).

I. Apply brick setting bed mortar to the back of the veneer units, working into the back of the brick unit using the flat side of a trowel and comb using a notched trowel (as above) and place the unit into the setting bed on the substrate wall. Work the thin brick unit into place by tapping, or sliding slightly back-and-forth, or up-and-down, or rotating slightly, until excess mortar is squeezed out at the edges of the veneer unit, completely filling the space between unit and bonding mortar. The thickness of the setting/bonding mortar bed shall be between $^{3}/_{8}$ in. and ¾" in (10 mm and 19 mm) to accommodate variations in the substrate surface, variations in the brick, and to adjust for plumbness and flatness of the wall. Use of a 48-inch-long straight edge is recommended to ensure a planar installation, sweeping over the surface and humoring (adjusting) the brick as needed to correct for anomalies.

J. Lay units to desired height with joints of uniform thickness. Grout the joints using Type N mortar mix per 2.03 above. Tool the joint when they are thumb print hard.

K. Bond shall be plumb throughout.

L. Lay units to avoid formation of cracks when units are placed.

M. Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Care should be taken to produce a flat finished surface where uneven substrates exist or where thin brick thicknesses vary. Lay masonry within the tolerances of TMS 402/602.

N. When positions of units shift after mortar has stiffened, bond is broken, or cracks are formed, remove and reinstall units in new mortar.
O. Avoid laying units where they would bridge active cracks or established movement joints in substrate materials. Cut where necessary to respect jointing in substrate.
P. Avoid mortar staining on the units during installation. Clean any mortar smearing or staining promptly to reduce final cleaning.
Q. Alternate 1: Use a proprietary 4-part MVIS system (2.08-G-1-b) applied to clean, sound concrete or CMU substrates, where no drainage layer is required.

3.05 EXTERIOR THIN SET APPLICATION TO FLAT CEMENTITIOUS SUBSTRATE (CONCRETE, CMU, AND CEMENT BACKER BOARD OVER FRAMED WALLS)

The following guidelines are intended for exterior application over reasonably flat substrates when using thin brick with uniform thickness.

A. Protect adjacent construction with appropriate means from mortar droppings and other effects of laying of brick masonry units.
B. Install flashing at the perimeter of thin brick veneer wall assembly, around openings, and at base of veneer, integrated with the WRB to prevent the moisture from entering the building and to transmit the moisture to the outside of the wall. Install weeps (weep screeds) at the bottom of the walls, integrated with the WRB to transmit the moisture to the outside face of the wall. Secure flashings with fasteners.
C. Apply liquid/fluid WRB membrane to clean concrete substrate surfaces.
    1. If drainage layer is used, WRB may be single layer of sheet or roll goods. Lap sheet goods per 3.02 C.
D. Install optional (recommended) drainage layer over sheet or roll goods WRB or liquid/fluid elastomeric WRB. Avoid creating dams or terminations that would impede the flow of water and moisture out of the wall, directing it to the exterior surface. Secure in place with fasteners.
E. Where exterior insulation is intended, rigid insulation should be chosen, and it should be installed over the optional but recommended drainage layer, secured in place with appropriate fasteners.
F. Apply CBB over WRB sheet or roll goods (or liquid/fluid WRB) and over optional (recommended) drainage layer, and over exterior rigid insulation, where used. Secure cement backer board in place with appropriate fasteners. Tape joints.
G. Spread brick setting (bonding) mortar bed onto the clean and dust-free substrate of concrete or CMU with compatible elastomeric liquid/fluid WRB, or onto CBB over WRB and/or optional (recommended) drainage layer, using the flat side of a trowel and comb using a notched trowel (3/16” to ¼” [5 mm to 6 mm] deep notches) to obtain an even setting bed. Use Type S polymer modified mortar (Latex-Portland Cement Mortar, per 2.02-D-2, above).
H. Apply brick setting bed (bonding) mortar to the back of the veneer units, working into the back of the brick unit using the flat side of a trowel and comb using a notched trowel (as above) and place the unit into the setting bed on the substrate wall. Work the thin brick unit into place by tapping, or sliding slightly back-and-forth, or up-and-down, or rotating slightly, until excess mortar is squeezed out at the edges of the veneer unit, completely filling the space between unit and bonding mortar; 100% coverage on the thin brick units. The thickness of the setting/bonding mortar bed shall be between $^{3}/_{8}$ in.

and ¾" in (10 mm and 19 mm) to accommodate variations in the substrate surface, variations in the brick, and to adjust for plumbness and flatness of the wall. Use of a 48-inch-long straight edge is recommended to ensure a planar installation, sweeping over the surface and humoring (adjusting) the brick as needed to correct for anomalies.

I. Lay units to desired height with joints of uniform thickness. Grout the joints using Type N mortar mix per 2.03 above. Tool the joint when they are thumb print hard.
J. Bond shall be plumb throughout.
K. Lay units to avoid formation of cracks when units are placed.
L. Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Lay masonry within the tolerances of TMS 402/602.
M. When positions of units shift after mortar has stiffened, when bond is broken, or when cracks are formed, remove and reinstall units in new mortar.
N. Avoid laying units where they would bridge active cracks or established movement joints in substrate materials. Cut where necessary to respect jointing in substrate.
O. Avoid mortar staining on the units during installation. Clean any mortar smearing or staining promptly to reduce final cleaning.
P. Alternate 1: Proprietary lath systems (2.08-F) are suitable for this application in lieu of the setting/bonding mortar application noted above. Apply over WRB and optional (recommended) drainage layer, and over optional insulation. Where proprietary lath system has an integral drainage layer, additional drainage layer is not needed. Where proprietary lath system has integral insulation, additional insulation may not be necessary.
Q. Alternate 2: Proprietary 3-part MVIS systems (2.08-G-1-a) may be used where no drainage layer is required, applied over concrete, CMU, or over CBB that is installed over (optional) drainage and insulation layers.

3.06 MORTAR JOINTS

A. Make joints straight, clean, smooth, and uniform in thickness.
B. Pointing: Tool exposed joints, slightly concave. Strike concealed joints flush.
C. Tool joints while slightly moist and thumbprint hard.
D. Joint Thickness: Make vertical and horizontal joints as required to achieve nominal dimensions on drawings and within tolerances listed in TMS 402/602.
E. Where fresh masonry joins totally or partially set masonry, clean and roughen set masonry before laying new units.

3.07 BOND PATTERN

A. Install brick masonry units in running bond pattern, unless otherwise **indicated on the Drawings**.

3.08 CUTTING BRICK MASONRY UNITS

A. When possible, use full units of the proper size in lieu of cut units.
   1. Cut units as required to form chases, openings, for anchorage, and for other appurtenances, and at all movement joints and terminations, as required, so as to eliminate units bridging across movement joints (or cracks) in substrate.
B. Cut and fit units with power-driven carborundum or diamond disc blade saw.
C. Clean back of units after cutting to remove dust and other deleterious material(s).

D. Discard units that are damaged during the cutting process, which do not meet the appearance standard of ASTM C1088.

3.09 CONTROL JOINTS / EXPANSION JOINTS

A. Size joints to accommodate anticipated movements with respect to moisture and thermal gradients in addition to building movements commensurate with the movement potential of the joint material(s).
B. Provide in masonry walls where **indicated on the Drawings**.
C. Make full height and continuous in appearance.
D. Control and expansion joints must be continuous through the backing, unless detailed otherwise.
E. Insert control joint filler in joints as wall is constructed.
F. Insert 50% compressible elastomeric (neoprene or equivalent) expansion joint material in properly sized expansion joints.
G. Apply sealant as specified in Section 07 92 00.

3.10 FLASHING

A. Flashing must be installed at all through wall penetrations and at lower boundaries of the adhered thin brick veneer installations.
B. Flashings will be integrated with the WRB materials to provide effective control of moisture exiting the wall assembly, with sealed corners, end dams and other accessories as needed.

3.11 OTHER EMBEDDED ITEMS

A. Build in wall plugs, accessories, flashings, pipe sleeves, and other items required to be built-in as the masonry work progresses.

3.12 PATCHING

A. Patch exposed brick masonry units at completion of the Work and in such manner that patching will be indistinguishable from similar surroundings and adjoining construction.

3.13 MISCELLANEOUS

A. Build in required items, such as anchors, flashings, weep screeds, sleeves, electrical boxes, frames, structural steel, lintels, anchor bolts, and metal fabrications, as required for complete installation.

3.14 FIELD QUALITY CONTROL

A. Have minimum 3 masonry units of each type proposed for Project tested in accordance with ASTM C 67 to verify conformance to Specifications.
B. Tests shall include absorption, Initial Rate of absorption and unit weight.

C. Employ and pay acceptable independent testing laboratory to perform testing
D. Per ASTM C 1088, after brick are placed in usage, the manufacturer or the manufacturer's agent shall not be held responsible for compliance of brick with the requirements of ASTM C 1088 for chippage and tolerances.

3.15 CLEANING

A. Exercise extreme care to prevent mortar splotches.
B. Do not attach construction supports to masonry walls.
C. Use only new cleaning products from previously unopened and untampered containers. Do not mix, or concoct, or blend cleaning materials unless specifically instructed to do so by the cleaning material manufacturer, and then only upon approval by the General contractor, Architect, and owner.
D. Identify a suitable, non-critical location, mutually acceptable to the General Contractor, Architect and Owner, to test cleaning methods for approval prior to mass cleaning of the installation.
E. Wash off brick scum and grout spills before scum and grout set.
F. Remove grout stains from walls using cleaning agent and methods recommended by brick manufacturer.
G. Test clean masonry in selected area with the least aggressive method possible that will attain the desired effect starting with "Bucket and Brush" method. Apply cleaning solution recommended by brick manufacturer in accordance with cleaning solution manufacturer's printed instructions and brick manufacturer's recommendations.
H. Once the cleaning method is established and approved, proceed to clean the building in total following established procedures.
I. Remove scaffolding and equipment. Dispose of debris, refuse, and surplus material offsite legally.
J. Correct efflorescence on exposed surfaces with commercially prepared cleaning materials acceptable to masonry unit manufacturer.
K. Do not use muriatic or hydrochloric acid as cleaning solutions.
L. Do not use abrasive cleaning equipment or methods.

3.16 PROTECTION

A. Provide temporary protection for exposed masonry corners subject to damage.
B. Bracing:
    1. Adequately brace masonry walls over 8 feet in height to prevent overturning and to prevent collapse unless wall is adequately supported by permanent supporting elements so wall will not overturn or collapse.
    2. Keep bracing in place until permanent supporting elements of structure are in place.
C. Limited Access Zone:
    1. Establish limited access zone prior to start of masonry wall construction.
    2. Zone shall be immediately adjacent to wall and equal to height of wall to be constructed plus 4 feet by entire length of wall on un-scaffolded side of wall.
    3. Limit access to zone to workers actively engaged in constructing wall. Do not permit other persons to enter zone.
    4. Keep zone in place until wall is adequately supported or braced by permanent supporting elements to prevent overturning and collapse.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03300, Cast-In-Place Concrete.

B. Section 05100, Structural Steel.

C. Section 06100, Rough Carpentry.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Certification: Use only American Welding Society (AWS) certified welders qualified to perform types of welding required. All welding to be inspected in accordance with Section 05100.

1.04 SUBMITTALS

A. Refer to Section 01300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: The following samples are required. Submit per Section 01300.

1. Submit sample for each type of abrasive safety nosing to Architect for review.

2. Manufacturer's full range of colors for Architect's selection.

D. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted.

E. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01300.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. American Institute of Steel Construction (AISC) Manual of Steel Construction, 15th edition (ASD).

C. AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.

D. AISC Code of Standard Practice for Steel Buildings and Bridges.

E. American Welding Society (AWS) Structural Welding Code - Steel, AWS Standard Code D1.1, current edition.

F. Conflicting Requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or these specifications, **[coordinate wording with Section 05100]** the more stringent shall govern.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Products shall be available at project when required for installation so as not to delay job progress. Installer for these products shall cooperate with installers performing work under other Sections involved to effect proper installation.

1.09 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel shapes, plates and bars: ASTM A-36.

B. Steel sheet: ASTM A446, Grade A.

C. Pipe: ASTM A-53, Type E or S, Grade B, Fy=35 ksi; hot dipped galvanized iron unless otherwise indicated or specified.

D. Bolts and nuts: ASTM A-307; machine bolts unless otherwise indicated or specified, galvanized when used with galvanized metal.

E. Expansion Anchors: Hilti Kwik Bolt II or approved equal; galvanized unless otherwise indicated. Lead shields or tamp-ins are not acceptable.

F. Steel tubing: ASTM A-500, Grade B, Fy=46 KSI.

G. Unistrut: ASTM A570, Grade 33 or ASTM 446, Grade A.

H. Galvanizing: Hot-dip process, ASTM A-153 or A-385 or A-386, as applicable, performed after fabrication into largest practical section. Weight of coating not less than 2 oz. per sq. ft. of surface. Where damaged, repair surface with one coat of hot process galvanizing repair compound, "Galvalloy", "Galvaweldolloy", or approved equal.

I. Primer: Tnemac Company "69 Special Red Primer"; Rust Oleum Corporation "1069 Heavy Duty Rust Inhibitor Red Primer"; Sherwin-Williams "Kem Kromik Primer"; or approved equal.

J. Fasteners/connectors:

1. Bolts and nuts: ASTM A-307, Grade A and supplemental S1.

2. Machine screws: Cadmium plated steel, Fed. Spec. FF-S-92.

3. Wood screws: Flat-head carbon steel, Fed. Spec. FF-S-111.

4. Plain washers: Round, carbon steel, Fed. Spec. FF-W-92.

5. Toggle bolts: Tumbler-wing type, Fed. Spec. FF-B-588, type, class, and style as required.

6. Lock washers: Helical spring type carbon steel, Fed. Spec. FF-W-84.

7. Masonry anchorage devices: Expansion shields, Fed. Spec. FF-S-325.

8. Lag bolts: Square head type, Fed. Spec. FF-B-561.

9. Tamper resistant fasteners: Snap-off head, or recessed socket for hex wrench with central pin.

10. Security fasteners: Unless otherwise noted, security screws and bolts shall be minimum 3/8"-20 stainless steel security socket pin requiring special tool; 8" o.c. maximum.

K. Safety nosings: For poured-in-place concrete stairs, provide safety nosings constructed of 6063-T5 aluminum nosing base material with a colored epoxy/abrasive filler. The safety nosings shall be 3" wide and shall run the full length of tread. Provide Balco R-305P, ribbed type No. 1 or approved equal.

L. Perforated metal decking for ramps, stairs and landings shall be 14 ga. steel decking with 5/32" dimples at 3/4" on center, staggered, as manufactured by DUUS Perforating Co., San Jose, CA or approved equal.

M. Stainless Steel: Shall be U.S. Standard revised gauges as specified, Type 302. All sheets shall be free from imperfections. All exposed and working sides shall be No. 4 finish.

1. Tops: All metal tops shall be one-piece welded construction of 14-gauge stainless steel reinforced on the underside with 14-gauge stainless steel hat sections welded in place so tops will support a minimum of 200 pounds per square foot without deflections. Ends shall be returned and closed. Edges shall be hemmed neatly.

2.02 MISCELLANEOUS ITEMS

A. Provide all miscellaneous steel shapes, braces, supports, anchors, bolts, etc., not specified or shown elsewhere, but required for erection and completion of work, including miscellaneous metal items shown under mechanical or electrical work, except as specifically noted otherwise.

1. Metal backing plates, anchor plates, etc. required for anchorage of mechanical and electrical fixtures and equipment to lightgage metal framing shall be furnished and installed by those trades.

2. Miscellaneous metal items embedded in concrete shall be furnished to the respective trades for installation thereunder. Furnish setting templates and/or proper execution of work.

2.03 CONNECTIONS

A. Except where bolted connections are shown, weld all joints and assemblies. Welds not shown on drawings shall be designed to meet intended use of item or assembly.

B. Sizes of bolts, screws or other threaded fasteners or anchorage not shown on drawings shall be of size required to meet intended use of item or assembly.

2.04 GALVANIZING

A. The following items shall be hot dip galvanized after fabrication:

1. All exterior items including those penetrating wall and only with partial exposure to exterior.

2. All items embedded in or anchored to concrete at exterior of building, even if not directly exposed or visible.

3. Only those interior items that are so noted shall be galvanized.

2.05 ASSEMBLIES

A. Fabrication, material and installation shall be as indicated and as specified. Assemblies include, but are not limited to the following. Examine Drawings for additional work required.

B. Angle frames and supports attached to or embedded in concrete construction shall be

galvanized after fabrication.

C. Pipe handrails: Fabricate and install as indicated, complete with rails, posts, fittings, brackets and anchorage.

1. Wherever practical, construct bends and sweeps by bending pipe. Use suitable pipe bending jigs to prevent crushing pipe. For short radius bends and sweeps, use formed, flush, welding type fittings.

2. Except where bolted connection are indicated, weld all joints and grind smooth. All bolts, fasteners, and miscellaneous items shall be galvanized.

D. Railings: Fabricate from material indicated, weld all joints and grind smooth. Ease corners. All pipe shall be smooth without rough spots, voids or other such imperfections, ready for paint.

E. Ladders:

1. Fabricate ladders for locations shown with dimensions, spacings, details and anchorages as indicated.

2. Comply with requirements of ASNI A14.3 except as otherwise indicated.

3. Fit rungs in centerline of flat bar type side rails. At flat bar type side rails, plug-weld, and grind smooth as outer rail faces.

4. Support each ladder at top and bottom, and at intermediate points spaced not more than 60" on centers. Use welded or bolted steel brackets designed for adequate support and anchorage, and to hold the ladder clear of wall with minimum 7" clearance from wall to rung centerline.

5. Extend rails 42" above top rung, and return rails to wall or structure unless other secure handholds are provided. If adjacent structure does not extend above top rung, goose-neck the extended rails back to structure for ladder access.

6. Provide nonslip surface on the top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufactured rung which is permeated with aluminum oxide grout.

7. Provide all necessary brackets and fittings for installation.

8. Provide metal landing at top rung where ladder bridges parapet wall.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to all work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where fabrication and installation of the work of this Section may properly commence.

B. Make all required measurements in the field to ensure proper fit of miscellaneous metal items.

C. Verify that miscellaneous metal may be fabricated and installed in strict accordance with the original design and the approved Shop Drawings.

D. In the event of discrepancy, immediately notify the Architect. Do not proceed with fabrication or installation in discrepant areas until discrepancies have been fully resolved.

3.02 GENERAL REQUIREMENTS

A. Fabrication and welding shall be in compliance with referenced standards.

B. Welded joints: All welds shall be full length or perimeter of joint or seam. Welded-in butt joints shall be V-groove type. Grind all exposed welds smooth. Welds in butt joints shall be ground flush with surface.

C. Surface finish: All exposed surfaces, corner, edges, etc., of items and assemblies shall be smooth, free of sharp and injurious points and edges.

D. Rough hardware:

1. Provide bent or otherwise custom fabricated bolts, plates, anchors, hanger, dowel, and other miscellaneous steel and iron shapes as required for framing and for anchoring or securing framing to concrete and other structures.

2. Manufacture or fabricate items of sizes, shapes, and dimensions required.

E. Shop clean: After fabrication, thoroughly clean steel of all loose mill scale, rust splatter, slag or flux deposits, oil, dirt, and other foreign matter.

F. Shop priming: After cleaning, except where other finishes are hereinbefore specified, all ferrous metal shall be given one shop coat of specified primer. Parts inaccessible after assembly or erection shall be given two coats of specified primer, second coat darker in color.

3.03 FABRICATION

A. Miscellaneous framing and supports:

1. Provide miscellaneous steel framing and supports which are not part of structural steel framework, as required to complete work.

2. Fabricate miscellaneous units to sizes, shapes and profiles shown; or if not shown, to require dimensions to receive adjacent other work to be retained by framing.

3. Fabricate the miscellaneous units from structural steel shapes, plates, and steel bars of welded construction with mitered joints for field connection, unless shown otherwise.

4. Cut, drill and tap units to receive hardware.

5. Equip units with integrally welded anchors for casting into concrete or building into masonry, and furnish inserts if units must be installed after concrete is placed.

6. Except as otherwise shown, space anchors 24" on center, and provide minimum anchor units of 1-1/4" x 1-1/4" x 8" steel straps.

7. Galvanized miscellaneous frames and supports where indicated.

3.04 ERECTION

A. Preparation: Furnish setting drawings, diagrams, templates, instructions and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete construction. Coordinate delivery of such items to project site.

B. Install miscellaneous metals and accessories in accord with reviewed Shop Drawings, referenced standards, manufacturer's installation recommendations or as directed by Architect.

C. Field Welding: Comply with AWS Code for procedures of manual shielded metal arc welding, appearance, and quality of welds made and methods of correcting welded work.

D. Installation:

1. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

    a. Adhesive anchors shall only be used at concrete block only and only at locations where detailed.

2. Cutting, fitting and placement:

    a. Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications.

    b. Set work accurately in locations, alignment and elevations, and make plumb, level, true and free from rack, measured from established lines and levels.

    c. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar constructions.

    d. Fit exposed connections accurately together to form tight hairline joints.

    e. Weld connections which are not to be left as exposed joints, but can not be shop welded because of shipping size limitations.

    f. Grind exposed joints smooth, and touch up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have not been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

3. Railings

    a. Furnish post setting sleeves to concrete trade; direct and supervise proper

setting and location of sleeves.

b. Set railing posts and grout between posts and setting sleeves with non-shrink grout.

E. Provide isolation of dissimilar metals from contact with one another with two coats of primer or approved equal isolation system.

3.05 TOUCH-UP & REPAIR

A. Immediately after erection, clean connections including field welds and bolted connections and paint exposed areas with same material used for shop priming. Brush or spray apply to provide minimum dry film thickness of 2 mils.

B. After installation of this section is complete, touch-up all damaged and abraded paint on installed assemblies, using paint specified for shop priming.

C. Touch up damaged areas in shop primed surfaces which will be concealed after erection. Leave in condition fit for finish painting by other trades.

D. Repair or replace defective materials as directed.

E. Adjust and lubricate hardware and leave entire installation clean and in good operating condition.

3.06 PROTECTION

A. Protect work and materials of this Section prior to and during installation and protect the installed work and materials of other trades.

B. Protect installed work from damaged from other trades.

C. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03100, Concrete Formwork.

B. Section 03200, Concrete Reinforcement.

C. Section 03300, Cast-In-Place Concrete.

D. Section 05100, Structural Steel.

E. Section 05500, Miscellaneous Metals.

F. Section 06180, Glue Laminated Structural Units.

G. Section 06400, Finish Carpentry & Millwork.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

1.04 SUBMITTALS

A. Refer to Section 01300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Provide mill certificates for D.F. pressure treated materials.

D. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01300.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

1.06 REFERENCES AND STANDARDS

A. California Building Code (CBC), edition as noted on drawings, as adopted by the California Division of the State Architect (DSA).

B. Plywood:

1. Plywood Design Specifications by the American Plywood Association (APA).

2. Voluntary Product Standard DOC PS 1 “Construction and Industrial Plywood.”

C. Lumber: American Softwood Lumber Standard DOC PS 20.

D. AITC 117, MANUFACTURING, Standard Specifications for Structural Glued Laminated Timber of Softwood Species.

E. AITC 117, DESIGN, Standard Specifications for Structural Glued Laminated Timber of Softwood Species.

F. ANSI/AITC A190.1, Structural Glued Laminated Timber.

G. ASTM D 3737 Standard Method for Establishing Stresses for Structural Glued Laminated Timber.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

1.09 PROJECT RECORD DOCUMENTS

A. Provide per Section 01700, Project Close-out Procedures.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber: Douglas Fir-Larch unless otherwise noted. Lumber designated as Douglas Fir South by WWPA is not acceptable. All lumber shall be graded under one of the following:

1. Rules No. 17, Standard Grading Rules for West Coast Lumber, current edition - WCLIB or Standard Grading Rules for Western Lumber, current edition - WWPA.

2. Standard Specifications for Grades of California Redwood Lumber, current edition - RIS.

A. Lumber:

1. Poles: All poles Douglas Fir and/or Ponderosa Pine conforming to ANSI 05.1 Specifications and Dimensions for wood pole except as follows:

a. Straightness: Poles may deviate from straightness in one plane and one direction only. A straight line joining surface of wood at ground line and surface of wood at top shall not be more than 1-1/2" from surface of pole at any joint.
b. Minimum sapwood thickness of 3/4".

c. Spiral grain or twists limited to one complete turn in any 30' of length.

d. Select poles for uniformity and appearance.

e. Seasoning checks shall not be considered defect except width of checks shall not exceed 1/2" at time of shipment. No restriction on length or depth of checks.

f. Butts and tips cut square before pressure treatment.

g. No undersize permitted but up to 2" oversize allowed.

h. Poles are specified by tip diameter as based on average natural taper of 1" in 10'.

i. Pressure treatment: Poles are to be pressure treated by McCormick & Baxter's process with Cellon (Pentachlorophenol in L.P.G.).

j. Treatment procedures in accord with AWPA Standard C23, "Pole Build-Construction-Preservative Treatment by Pressure Processes". **Incising is not**

permitted.

B. All lumber shall be new with no re-use except as permitted by Architect. **No boxed heart** will be permitted in **3x or thicker**. Maximum moisture content 19%.

1. All framing, except as otherwise noted - No. 1.

2. 6x and thicker members - Select Structural.

3. Blocking, bridging, furring, stripping and nailers - No. 2.

4. Redwood, Unless Otherwise Noted: Foundation Grade.

5. Plywood Sheathing: C-D with exterior glue (PS 1-07), T & G Edges where shown.

6. Sills, Stripping at Roof and Hip and Ridge Nailers for Steel Tile: DF pressure treated with approved preservative to obtain minimum penetration of 1/4" into all surfaces of wood (Mill certificate for this treatment must be furnished with shipment). Redwood sill may be used only for non-bearing stud walls or where shown explicitly on Structural Drawings.

7. T & G Decking: DF or Hemlock, 6 inch nominal width, thickness as shown on Drawings. All material kiln dried, maximum moisture content 15% in decking. Random lengths not permitted; all joints over supports. For roof decking, use "Select Dex", Pattern WC-200.

8. Plywood Siding: 4' x 10' x 5/8" rough sawn Redwood 303 Siding Exterior (PS 1-07).

9. Exterior Decking: California Redwood, select decking, 2 x 6. Beams, ledgers and other framing members to be redwood, select structural, open grain.

10. Fascia: Tight Knot Cedar, S4S.

C. Laminated Veneer Lumber (LVL) Division of the State Architect Product Acceptance No. PA-045.

D. Parallel Strand Lumber (PSL): Division of the State Architect Product Acceptance No. PA-047 (DF/2.0E)

E. Laminated Strand Lumber (LSL) for Blocking and Rim Joists Applications Only: Division of the State Architect Product Acceptance No. PA-049.

F. Preservative: Pentachlorophenol in oil colored with pigment to produce strong, contrasting color on wood which has been treated per AWPA C1-91 and C15-91.

G. Fastenings:

1. Nails: ASTM F1667 common wire nails or spike; box nails not permitted. All nails

exposed to weather shall be hot dipped galvanized. Wire gauges and lengths for common nails are to be as follows: 16d nails are .162 inches round x 3-1/2 inches; 10d nails are .148 inches round x 3 inches; and, 8d nails are .131 inches round x 2-1/2 inches.

2. Bolts: Machine bolts, unless noted otherwise (ASTM A-307, Grade A).

3. Washers: Use for all bolts or lag screws bearing on wood. Malleable iron or steel washer at head and nut as shown on Drawings. Washers not required under heads of carriage bolt, but nut shall have cut washers.

4. Adhesive for Plywood Floor Sheathing: Conform to APA-AFG-01.

5. Miscellaneous Fasteners: Steel Hardware, Joist Hangers, Post bases, Tie downs, etc: ASTM A36, galvanized at exterior locations; Simpson, Silver or approved equal.

6. Machine Nailing: The use of nailing guns is subject to a satisfactory jobsite demonstration and the approval of the Structural Engineer and DSA. This approval is subject to continued satisfactory performance. If the nailheads penetrate the outer ply or if the minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory.

H. Building Paper: Pabco, J.M., or approved equal, #15 asphalt saturated felt.

I. Non-shrink Grout: Embeco, Non-metalic, or approved equal.

J. Caulking: Furnished and installed under this Section. (Materials and workmanship shall conform to Section 07900.)

2.02 QUALITY CONTROL

A. Grade mark each piece of lumber by agency approved by DSA. Lumber Manufacturer's Association Certificates may be accepted in lieu of such grade and trade marks for complete, unbroken original bundles readily identifiable to certificate, only. Certificates will be required for items used structurally but furnished under Millwork Section.

B. Plywood Sheathing: Each panel shall be legibly identified as to type, grade and species glue per American Plywood Association specification.

2.03 EQUIPMENT

A. Powder Actuated Fasteners: Powder-actuated fastening system may be used where shown, or specified, in structural connections (connections carrying computed stresses). All connector and powder charges shall be used strictly in accord with manufacturer's instructions. Operators shall be certified by manufacturer of tool, and application methods shall be in accord with Article 28, Powder-Actuated Tool, Paragraph 1685, of Title 8, California.

B. Tools and fastenings shall be equal to Hilti Systems. Demonstration of satisfactory and secure fastening made it side under actual job conditions will be required before proceeding with work. Evidence of inadequate holding power will be cause for rejection of such fastenings.

PART 3 - EXECUTION

3.01 ERECTION AND BRACING

A. Furnish and erect rough structural wood framework, including posts, beams, rafters, studs, plates, nailers, blocking, bridging, sheathing, stripping, purlins, grounds and furring.

B. Furnish all plant, labor, material, tackle, guys, braces, scaffolds, staying and equipment necessary to erect rough carpentry components and to hold them safely in position until permanent connections are completed. Permanent connections as used herein refer to all hardware and include all structural work of any description and attachment thereof to the surrounding walls.

C. Wherever stacks of material, erection equipment or other loads are carried by work during construction, make provisions to take care of stresses and strains resulting. Keep temporary bracing in place until permanent walls and roofs are completed; provide temporary bracing sufficient to keep structure stable, plumb and in line until completed. Place temporary bracing to allow freedom of workmen in building and erecting other work.

3.02 FRAMING

A. Partition and Wall Furring Framing: Wood studding of size called or spaced as shown. Use top and bottom plates - double top plate and lap at each intersection with walls or partitions. Stagger joints 4' in upper and lower member of top plate, unless shown otherwise. Frame openings with double studs at each side, with headers and lintels as shown.

1. Stud partitions or walls, more than 10' but not more than 20' in height, to have blocking of same width and thickness as stud; fit snugly and nail into studs so as to provide maximum 8' space.

2. Studs that are to receive direct application of finish shall be square cut and in true plane. Provide solid blocking for all plywood joints.

3. Top plate splices for all walls shown on roof framing plans are essential for continuity.

4. Wherever stud walls meet masonry and at other locations shown, install against continuous pad of 1" thick rigid fiberglass insulation.

B. Framing for Piping: Frame partitions containing any piping to give proper clearance; place

pipe 1-1/2 outside diameter or less in center of plate using neat round holes; no notching allowed; pipes not to pass through sills or plate less than 5-1/2" in width. Furr partitions where required to conceal piping.

C. Fire Blocking: Comply with CBC, Section 708. Provide 2" nominal thickness lumber for blocking by width of enclosed spaces within partition; provide fire blocks at intersection of interior and exterior walls with ceilings and roof to effectively cut all communication by fire through hollow concealed space, and prevent vertical and horizontal draft. Use continuous row of fire furring; place in such manner that no concealed air spaces greater than 10' in any direction occur. Fire blocking and draft stops shall be provided in conformance with CBC 708.

D. Blocking, Backing, Stripping and Nailing Members: In addition to normal wall blocking, install necessary nailing member for plywood panels, so that all edges fall on solid framing. Provide solid blocking for gypsum wall board only at cut or square edges. (Tapered edges do not require blocking.) Provide blocking for anchorage or nailing of all finish; wood and metal door frames (including wall and ceiling access doors); metal coverings; plasterwork; nailing members used in connection with roof decking; blocking and backing required by all wall or ceiling hung equipment and accessories (including suspended acoustic ceiling), and by Mechanical and Electrical Contractors for heating, plumbing and electrical fixtures.

E. Glue Laminated Members: Do not erect any for which Inspectors Certificate has not been furnished. Cutting is not permitted, except as shown on Drawings, or with written approval of Structural Engineer.

F. Recessed Fixtures: Frame openings for panel boxes and other equipment, according to requirements of fixtures provided.

G. Roof Strips, Roof Curbs and Nailers: Install at openings through roof, except where prefabricated curbs are shown or specified.

H. Plywood Sheathing: See Drawings for thickness. All joints of wall sheathing must bear on studs or blocking. All plywood nailing shall be as shown on Structural Drawings. Closer nail spacing applies not only at all edges of all sheets, but also over all walls or beams, and farthest nail spacing applies only at interior bearings other than as specified above.

Use of nailing gun to apply nails is subject to written approval of Architect and such approval will be qualified to insure results being equal to that obtained with hand nailing; use of abut on framing member less than 2-1/2" wide will not be approved nor will such use be permitted on wall. Where electrical or mechanical requirements require interruption of plywood pattern, same must be submitted to and approved by Structural Engineer through Architect.

I. Nailing: Penetration of nails or spikes not shown otherwise half length of nails into piece of receiving points; however, to connect pieces 2" net in thickness, 16d nails may be used unless shown otherwise. Do not drive nails closer together than half their length nor closer to edge of piece of lumber or timber than 1/4 of their length; opening and size of nails to be such that splitting will not occur; bore holes for nails wherever necessary to prevent splitting;

bore diameter of hole smaller than diameter of nail spike; see Nailing Notes on Drawings. Wherever nails of normal length may penetrate and show in exposed work, use nail of specified diameter and shorter length.

J. Screws: Driving into place not permitted. Soap may be used to lubricate screws. In placing lag screws, first bore holes of same diameter and depth as shank; bore holes for threaded portion of screws with bit 70% shank diameter. For wood screws, #14 and larger, drill lead holes for shank and threaded portions of 7/8 times shank and thread root diameter respectively.

K. Steel Plates and Shapes Bolted to Wood: Bore holes in timber same diameter as bolt; use steel piece as templates for locations of holes; tighten nut or rods and bolt at time of installation and re-tighten before covering up just before final acceptance of the work; examine accessible nut, re-tighten any to be found loose for exposed work, cut protruding bolt ends off within 1/8 inch of bolt head and file all burrs off.

L. Gypsum Sheathing: Apply horizontally and fasten by nailing in accordance with CBC Table No.
25A-G.

M. Rough and Framing Hardware: Furnish and install all rough hardware such as, nails, spikes, bolts, screws, drift pins and dowels. Furnish and install all framing clips, hangers, splice plates and other framing hardware. Furnish anchor bolts for installation in forms under Section 03100.

N. Decking: Where roof decking will be exposed as ceiling of rooms below it is both rough framing and finish carpentry. Handling and installation shall preserve intended architectural effect of soffit finish. Install decking with face pattern down (exposed). Each piece is to be toe-nailed at each support with one nail and face nailed with one nail, as shown on Drawings. Use ring shanks nails. End joints shall be butted tight and joints between courses drawn up tight by supplementary nailing as required; such supplementary nailing shall not affect appearance of underside. Broken, chipped, marred face, or other unnatural defects will be justification for rejection where installed in exposed locations. Do not mar surface of decking and adjacent materials.

O. Poles: Set base at designated elevation on concrete, center poles on grid lines and have annular space filled with Class Concrete as specified in Section 03300. Cut daps for framing neatly and accurately, limiting saw overcut to 1/8" and holding face to face of dap dimension to 8-1/2" dimensions given plus or minus 1/8". Paint required daps with pentachlorophenol.

P. Preparation for steel shingles: After application of felts install redwood or cedar lath strips 24" o.c. over rafters from eaves to ridge. Nail 12" o.c. with 4d common wire nails. After lath has been glazed install 1x2 stripping (pressure treated as specified hereunder) 10" o.c. parallel to eaves and nail at each rafter position with 5d common wire nails. Coordinate layout of stripping with steel shingle installer for proper spacing. 1x2 stripping to be installed in 48" lengths leaving 1/2" gaps between for drainage.

3.03 MISCELLANEOUS INSTALLATION

A. After installation of metal items specified in Section 05100 and 05500 (or Section 05110) touch up abrasions or voids in shop prime coat, using same material specified for priming.

B. Provide curbs and bolting for mechanical equipment as shown on Mechanical Drawings.

C. Provide vent holes as shown on Drawings.

D. At sound-deadened partitions install plates on double bead of non-skinning type, butyl-based caulking compound.

E. For items involving more than one section of these Specifications, coordinate work of all trades and be responsible for installation of item.

F. Install railing, using specified non-shrink grout in accord with manufacturer's printed instructions.

G. Caulking: (See Section 07900 for locations where joint sealants will be applied.) At other locations, and wherever required, apply specified material neatly and in accord with manufacturer's written instructions. Apply with sufficient pressure to completely fill joints. Clean surrounding material of excess caulking.

H. Building Paper: Install on wall surfaces where finish will be metal siding or veneer. Apply 2 layers weatherboard fashion with 2" laps to horizontal joints and 6" laps at vertical joints and corners. Use 3/8" head galvanized nails, nailing sufficiently to hold without buckling. Repair all damaged places before installation of finish materials. Installation of paper finish for cement plaster is included in Section 09200.

END OF SECTION

S:\MASTER SPECIFICATIONS\DIVISION 6 - CARPENTRY\06100.DOC(3/30/2000)

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry.

B. Section 06 41 13, Wood Laboratory Casework-Oak Fronts

C. Section 06 41 14, Wood Laboratory Casework-Plam Fronts

D. Section 07 92 00, Joint Sealants.

E. Section 08 11 13, Hollow Metal Doors & Frames.

F. Section 09 91 13, Exterior Painting.

G. Section 09 91 23, Interior Painting

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Work shall be done under direction of a capable foreman experienced in installation of finish carpentry work.

E. Carefully plan and lay out all finish work; cooperate with other trades.

F. Workmanship shall be of highest quality. Materials that are marred or otherwise damaged during installation shall be immediately replaced at no additional cost to the Owner.

G. All millwork shall be manufactured in accordance with the standards in the latest edition of the Manual of Millwork of the Woodwork Institute in the grade or grades hereinafter specified or shown on the drawings. Grade mark and mill identification shall appear distinctly legible on back of each piece of lumber. No marks shall appear in exposed faces of work to receive transparent or semi-transparent finishes.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: The following samples are required. Submit per Section 01 33 00.

1. Submit sample for each type of trim, shapes, assemblies, etc., as necessary and hardware to Architect for review.

2. Manufacturer's full range of colors for Architect's selection.

D. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted.

E. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

F. Before delivery to the job site, the millwork supplier shall issue a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the millwork products he will furnish for this job, and certifying that they will fully meet all the requirements of the grade or grades specified.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. Manual of Millwork as adopted by the Woodwork Institute (WI).

C. Plywood: Guide to Plywood Grades as published by the American Plywood Association, latest edition. U.S. Product Standard PS 1-83.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Products shall be available at project when required for installation so as not to delay job

progress. Installer for these products shall cooperate with installers performing work under other Sections involved to effect proper installation.

B. Materials shall be protected continuously after grading, during storage, transportation and handling, in such a manner as to avoid exposure to moisture conditions that could increase their moisture content.

C. Protect exterior work from rain and other moisture until it can be finished.

1.09 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Exterior Trim (including Fascia):

1. Redwood, B-grade or better, dry, rough sawn face, for opaque finish.

2. Custom Grade Western Cedar, for transparent finish.

B. Interior Trim:

1. W.I. Custom Grade V.G. Douglas Fir, for opaque finish.
Finish for all trim where hardwood is not indicated.

2. W.I. Custom Grade Birch, for transparent finish.
Finish where hardwood is indicated.

C. Moisture content shall be a minimum of 6% and shall not exceed 12% up to 2 inches nominal thickness and shall not exceed 19% for pieces thicker than 2 inches up to 4 inches nominal thickness.

D. Exterior Plywood Soffit: Match existing where being replaced or required.

E. Interior Plywood: Match existing where being replaced or required.

F. Exterior Siding: Match existing where being replaced or required.

G. Exterior Plywood Siding: Match existing where being replaced or required.

H. Wood Preservative: Dip or brush treat all exterior wood except Redwood or Cedar unless otherwise noted; per Manual of Millwork, WIC.

J. Adhesives: As recommended by the manufacturer for the intended use and materials required.

K. Fasteners: Provide all fasteners as indicated on drawings or shop drawings or as necessary for proper installation of products installed herein, in sizes, quantities sufficient to draw and hold products rigidly and permanently in place. Fasteners shall be selected for concealed appearances.

1. Nails: Hot-dipped galvanized for all exterior work. Bright finish finishing nails for all interior work. Ring shank nails for all exterior decks.

2. Bolts: Machine bolts, unless noted otherwise.

3. Washers: Use for all bolts or lag screws bearing on wood. Malleable iron washers shall be used for all exposed work at head and nut. Malleable iron or steel washers to be sized at 16 time area of bolt and not less than 1/2 bolt diameter in thickness. Cut washers may be used only where specified. Washers not required under heads of carriage bolts, but nuts shall have cut washers.

M. Miscellaneous Items: Provide all miscellaneous fasteners, brackets, supports, connectors and accessory items as indicated on the Drawings or as required by the product manufacturer for a complete and proper installation of the materials, products or systems specified in this Section.

PART 3 - EXECUTION

3.01 MILLING WORK

A. Mill to dimensions and profiles shown, and match existing where indicated. Except where exact length can be determined, material shall be provided long for cutting and fitting in field.

B. "Back out" reverse side of trim when 5/8 inch or more thick or 1-5/8 inches or more wide.

C. Kerf unexposed side of exterior millwork where "cupping" may occur.

3.02 PRELIMINARY PAINT/FINISH OF MILLWORK

A. All surfaces, edges and ends of millwork to be painted shall be primed before shipping. Unexposed surfaces to be in contact with concrete and masonry shall receive two coats of primer. Primer shall be an alkyd enamel undercoat applied in accordance with manufacturer's specifications.

B. All surfaces, edges and ends of millwork to receive stain or transparent finish shall be sealed at the shop before shipping. Primer shall be an approved clear wood preservative such as "Woodlife", Pentaseal" or approved equal. Preservative materials shall not prevent later field application of stain or clear finish from penetrating the wood. Millwork shall be tied, shipped and stored in such a manner as to avoid warping, twisting and curling. Any such warped millwork may be rejected by the Architect.

C. All unexposed edges cut on the job shall be primed with the same primer used in the shop.

D. Redwood shall not be shop primed.

3.03 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. In the event of discrepancy, immediately notify the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.04 PROTECTION

A. Protect work and materials of this Section and other sections prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

C. Exposed finish shall be free from scratches, dents, permanent discolorations and other defects in workmanship or material.

3.05 INSTALLATION

A. General: Do no millwork until wet operations are completed and concrete, masonry and plaster work has thoroughly dried and millwork has been primed or sealed in approved manner.

B. Installation of finish carpentry and millwork shall conform to the applicable requirements of the W.I. "Manual of Millwork".

C. Interior Frames: Install plumb, square and true, securely wedged and anchored to structure. Countersink face nails.

D. Trim Members: Install level, plumb and true, with member neatly and accurately scribed in place. Install trim in single lengths, running trim in as long a length as practical for species specified. Butt joints to be back-beveled, exterior and interior angles mitered.

E. Nailing: All nails to have required penetration into holding member per Title 24, Table 23A-1-G.

1. Exterior Trim: 10d nails or less, use finish nails set 1/16 inch below face, without putty. 10d to 20d nails, use common nails driven flush without hammer marks and putty. 20d or over, use common nails driven flush without hammer marks and putty.

2. Interior Trim: Set nails 1/16 inch below face, with putty. No putty where finish will be clear.

3. Exterior Plywood: Nails long enough to penetrate structural backing 1 inch. Use galvanized box nails, driven flush without hammer marks.

4. Interior Plywood: Install with grain texture vertical, with edges and ends occurring only

over bearings. Use aluminum or stainless steel finish nails in 8d size for 5/8 inch thick plywood and 6d for 3/8 inch thick plywood. Nail 6 inches o.c. along all sheet perimeter edges and 12 inches o.c. along all intermediate bearings.

F. Wainscot: Install wainscot system per manufacturer's installation recommendations, using trim, fasteners and attachments required.

G. Panels and moldings are to be mechanically fastened through gypsum board backing and into wood or metal studs with expansion anchors per manufacturers recommendation. Provide in addition to anchors, construction adhesive per manufacturers recommendation. Provide continuous sealant to all panel molding connections to make waterproof. Moldings shall be detailed so as not to cause damage to adjacent moldings or panels if vandalized or removed.

H. FRP: Install FRP panels per manufacturer’s installation recommendations using trim, adhesive, fasteners and other means required. Install such that no fasteners are visible in panel field.

3.06 WORKMANSHIP

A. Exposed surfaces shall be free from tool marks, torn grain, cross sanding, or workmanship defects that cannot be concealed by specified painter's finish.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The following specifications for Wood Laboratory Casework and related equipment outline the minimum requirements expected by the Owner and Architect on this project.

B. Section Includes:

1. Furnishing, delivering to the building, uncrating, setting in place, leveling, and anchoring all casework, countertops, equipment, and technical products listed in the specifications, equipment schedule or shown on the drawings.
2. Furnishing and installing filler panels and scribes as required for finished installation.
3. Furnishing laboratory service fixtures and fittings, as described in the specifications, equipment list or shown on the drawings, that are directly attached to the casework or equipment, complete with tank nipples and lock nuts for mounting on tops or curbs. Installation and final connections will be by other respective trades as part of their work.
4. Removal of all debris, dirt, and rubbish accumulated as a result of installation of this equipment, to an onsite container provided by others.

1.02 RELATED DIVISIONS AND SECTIONS

A. Section 06 10 00, Rough Carpentry.

B. Section 09 65 13, Resilient Flooring and Base

C. Division 22 00 00, Plumbing

D. Division 23 00 00, HVAC

E. Division 26 00 00, Electrical

F. Division 27 00 00, Communications

1.03 REFERENCES

A. ADAAG: 2004 Americans with Disabilities Act Accessibility Guidelines; Revised 2010 ADA Standards for Accessible Design.

B. ANSI/ISEA Z358.1-2014: Emergency Eyewash and Shower Equipment.

C. NFPA 30: Flammable and Combustible Liquids Code.

D. NFPA 45: Standard for Fire Protection for Laboratories Using Chemicals.

E. SEFA: Scientific Equipment and Furniture Association Recommended Practices. Desk Reference, 5th Edition, 2014. www.sefalabs.com

1. SEFA 1-2010: Recommended Practices for Fume Hoods.
2. SEFA 2-2010: Recommended Practices for Installation.
3. SEFA 3-2010: Recommended Practices for Work Surfaces.
4. SEFA 7-2010: Recommended Practices for Laboratory Service Fixtures.
5. SEFA 8-W-2014: Recommended Practices for Wood Laboratory Grade Casework.

F. California Air Resources Board; CARB Phase 2 Compliant.

G. ANSI/HPVA HP-1 2009: Hardwood Veneer Core Plywood.

H. ANSI A208.1-2009: Particleboard (PBC); Composite Panel.

I. ANSI A208.2-2009: Medium Density Fiberboard (MDF); Composite Panel.

J. UL-1805: Laboratory Fume Hoods.

K. ANSI/ASHRAE 110: Method of Testing Performance of Laboratory Fume Hoods as Manufactured.

1.04 SUBMITTALS

A. Refer to Section 01 33 00 for Submittal Procedures.

B. Shop Drawings: Submit shop drawings showing plans, service rough-Ins, elevations, sections, end views, service chases, countertop details, location and type of sinks and service fixtures, installation details, and location of grounds/blocking within walls for adequate wall cabinet reinforcement.

C. Manufacturer's Data:

1. Provide data indicating compliance with SEFA 8-W-2014, Laboratory Furniture Certificate of Performance Test from SEFA approved, Independent Test Facility.
2. Provide Test Report from SEFA approved, Independent Test Facility, certifying that wood casework finish complies with SEFA 8-W-2014, Chemical Resistance Testing requirements.

D. Selection Samples: Submit one (1) set of manufacturer's standard color chips for wood casework.

1.05 QUALITY ASSURANCE

A. All laboratory casework, including cabinetry, work surfaces, sinks, and

accessories, service fixtures and fittings, fume hoods, and technical products should be provided by the Wood Laboratory Casework Manufacturer.

B. Provide certification that laboratory casework shall meet the performance requirements described in SEFA 8-W-2014.

C. Provide Casework manufactured and assembled in the USA.

1.06 PROJECT SITE CONDITIONS

A. Building: Should be enclosed and weather-tight. HVAC system should be operating and maintaining a temperature range of 65-80 deg F with relative humidity range of 30%-50% to maintain acceptable wood casework moisture content, and to prevent problems such as drawers swelling and doors warping.

B. Additional Conditions:

1. Required grounds/blocking in walls for reinforcement of wall-mounted cabinets must be in place.
2. If floor tile is required under casework, it must be in place.
3. Overhead ductwork, ceiling grid, tile, and light fixtures must be in place.
4. Wet operations should be complete.
5. Painting should be complete.
6. Service lines for water, gas, etc. must be flushed clean of dirt and chips, capped and tested for leaks prior to the Plumber's final connections.
7. Electrical service and lighting should be available in each room where casework will be installed.

C. Field Dimensions: Should be confirmed prior to product fabrication. General Contractor shall provide Guaranteed Dimensions if actual field dimensions are not available in time frame necessary to meet lead times for Laboratory Casework Manufacturer to produce and deliver to jobsite.

1.07 DELIVERY, STORAGE, HANDLING

A. Delivery: Products shall be delivered to the project site in undamaged condition, unloaded by casework installer, distributed to required rooms, unpackaged, and made ready for installation.

B. Storage: If rooms are not ready for installation, store product indoors, in ventilated areas with constant temperature range of 65-80 deg F, and range of relative humidity as noted in 1.06 A. Do not remove wrapping or packaging material. Laboratory Casework Manufacturer not responsible for off-site storage.

C. Handling: Use proper moving equipment to unload and distribute equipment and utilize personnel that are experienced in moving furniture and equipment.

D. Waste Disposal: Casework installers shall remove refuse resulting from their

casework installation and place in trash container and leave installation site clean and free of debris. Trash container shall be provided by the General Contractor.

1.08 WARRANTY

A. Lifetime Warranty: Provide written warranty with close-out documents stating that this manufacturer shall guarantee that all Wood Casework provided on this contract to be free from defects in material and workmanship for the life of the product in the application and location installed, Purchaser shall notify Manufacturer's representative immediately of any defective product. Manufacturer shall have a reasonable opportunity to inspect the goods. No product shall be returned without purchaser's receipt of written shipping instructions from the manufacturer.

B. Warranty limitation: Casework must be installed by a factory certified installer or Lifetime Warranty shall be negated to a 2-Year Warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The products of Sheldon Laboratory Systems, Crystal Springs, MS are specified herein as the standard of quality required on this project. Tel: 601-892-2731.

B. The following Manufacturers are approved to Bid this project based on providing Wood Laboratory Casework and Technical Products as specified, unless they submit a list of Product Deviations to the architect at least ten (10) days prior to Bid Date and receive written approval by addendum to Bid on their deviations.

1. Sheldon Laboratory Systems
2. Labscape Furniture & Equipment
3. Diversified Casework

2.02 MATERIALS

A. General:

1. All casework shall be of modern design and shall be constructed in accordance with the recommended practices of the Scientific Equipment and Furniture Association. First class quality casework shall be established by use of modern machinery, tools, fixtures, and skilled workmanship.
2. The following definitions apply to wood laboratory casework units. Size and type of units is indicated on the drawings or equipment list.

    a. EXPOSED SURFACES of casework include exterior surfaces visible after installation when all doors and drawer fronts are closed. Visible surfaces in open cases or behind clear glass doors

shall be considered as exposed portions. Back of drawer fronts and panel doors shall be considered as exposed surfaces. Bottoms of wall hung cabinets shall be considered as exposed.

b. SEMI-EXPOSED SURFACES of casework shall include interior surfaces exposed to view only when opaque doors are open.

c. UNEXPOSED SURFACES not visible after installation include back rails, top side rails, stretchers, web frames, blocking, components concealed by drawers, underside of knee spaces and drawer aprons, and tops of 82” high tall and wall hung cabinets.

B. Casework Materials:

1. Materials used for construction of cabinets, cases and tables as specified herein shall meet or exceed the minimum standards as described.

a. All exterior surfaces exposed to view after installation, and all cabinet interior surfaces shall be Red Oak with the exception of back panels behind opaque doors which shall be Hardboard, and drawer boxes which shall be Birch.

b. All plywood panels with veneer core, particleboard core, or MDF core shall be CARB Phase 2 Compliant.

c. Exposed solid wood: Plain sawn Red Oak lumber, Grade FAS or better, clear and free of defects. Lumber shall be air dried, then kiln dried, and tempered to a moisture content of 6%-9% before use.

d. Unexposed solid wood: Other hardwoods may be used that are Grade FAS or better, clear and free of defects, and properly dried in same manner as exposed solid wood.

e. Plywood: Hardwood Veneer Core Plywood shall be minimum 3-ply (1/4”), 5-ply (1/2”), or 7-ply (3/4”) with select Red Oak, Grade A-1, plain sliced, book match, veneer face and back, and shall be compliant with ANSI/HPVA HP-1 2009. All 9-ply (1”) plywood shall be Grade A-1, whole piece, rotary cut, oak veneer face and back. Use of other hardwood face veneer is acceptable in unexposed areas. Combination core with composite cross bands is acceptable in lieu of veneer core.

f. Plywood: Composite Core Plywood for cabinet drawer fronts and doors shall be 3-ply, 3/4” thick select Red Oak, Grade A-1, plain sliced, book match veneer face and back, and shall be compliant with ANSI A208.1-2009 (PBC) or ANSI A208.2-2009 (MDF).

g. Banding: Plywood panels shall be edge banded where specified herein with 3mm solid Oak edge band.

h. Hardboard: Tempered hardboard shall be 1/4" thick. All hardboard shall be composed of wood fibers and resinous binder compressed under heat and pressure.

i. Glass: Wall Cabinet framed swinging and framed sliding doors shall have 1/8” float glass. Wall Cabinet and Tall Cabinet frameless sliding doors shall have 1/4” float glass with polished edges. Tall Cabinet framed swinging doors shall have 1/4" float

glass.

j. Tempered Glass: Tempered safety glass will be provided ONLY WHEN SPECIFICALLY CALLED FOR on the drawings or equipment list.

2.03 FABRICATION

A. General:

a. The Wood Cabinetry selected for this project shall be as follows.
b. Cabinet Front Style: CLASSIC SERIES – Red Oak.
c. Cabinet drawer fronts and panel doors feature a square edge with slight radius, partial overlay style with vertical match grain fronts and Oak edge band.
d. Drawer fronts and panel doors on each cabinet are cut from one (1) Oak composite core plywood panel as a MATCHING FRONT SET.

2. Cabinets, tables, and other units shall be of the size and configuration indicated on the drawings and/or equipment list. Wood cabinetry is bored, doweled, grooved, and rabbeted construction.
3. Base Cabinet Construction:

a. Cabinet End Panels shall be 3/4", Oak veneer core plywood. End panels shall be doweled and glued to top frame members, intermediate rails, and bottoms.
b. Vertical Partitions are 3/4", Oak veneer core plywood.
c. Exposed or semi-exposed edges of end panels, partitions, bottom panels, and shelves shall be edged with 3mm solid Oak edge banding.
d. Two-Piece Top Frame consists of nominal 1" X 3" solid Oak front rail, with back edge grooved to receive cross rails, and similar 1” X 3” solid Oak back rail, both set flush with cabinet ends, doweled and glued into place.
e. Top Frame Cross Rails are nominal 1" X 2-1/4" solid hardwood fully housed into front and back rails with tongue and groove joints to form a full four-sided top frame. CROSS RAILS ARE ONLY PROVIDED IF SPECIFICALLY CALLED FOR.
f. Intermediate Rails are provided on all base cabinets between drawer/drawer configurations and drawer/door configurations. Rails are 1” X 3” solid Oak with back grooved to receive lock security panels (when panels are required). Rails shall be set flush with cabinet ends, doweled and glued into place.
g. Bottom Panel shall be 3/4”, Oak veneer core plywood. Panel shall be set flush with cabinet ends, doweled and glued into place.
h. Back Panel shall be 1/4" thick Oak plywood when cabinet interior is exposed and 1/4" hardboard when cabinet interior is semi-exposed. Backs are recessed into grooved end panels and

secured on all four (4) sides.

i. Recessed Front Toe Rail shall be 4”x 3/4" Oak veneer core plywood.

j. Cabinet Shelves shall be 1”, Oak veneer core plywood. Shelves are adjustable on 32mm centers, supported by four (4) nickel-plated steel pin and socket type shelf clips.

k. Security Panels are 1/4" thick hardboard. Panel is provided between drawer/drawer and drawer/door base cabinets only when called for, OR WHEN LOCKS ARE SPECIFIED TO BE KEYED DIFFERENT.

4. Wall Cabinet Construction:

a. Cabinet End Panels shall be 3/4", Oak veneer core plywood. End panels shall be doweled and glued to top and bottom panels.

b. Vertical Partitions shall be 3/4", Oak veneer core plywood.

c. Exposed or semi-exposed edges of end panels, top and bottom panels, partitions, and shelves shall be edged with 3mm solid Oak edge banding.

d. Top and Bottom Panels shall be 1”, Oak veneer core plywood. Panels shall be set flush with cabinet ends, doweled and glued into place.

e. Back Panel shall be 1/4” Oak plywood when cabinet interior is exposed and 1/4" hardboard when interior is semi-exposed. Back panels shall be rabbeted into ends and secured on all (4) sides.

f. Cabinet Shelves shall be 1”, Oak veneer core plywood. Shelves are adjustable on 32mm centers and supported by four (4) nickel-plated steel pin and socket type shelf clips.

g. Top and Bottom Back Rail shall be 4” x 3/4” hardwood veneer core plywood doweled and glued into end panels, and used for attaching the cabinet to wall.

5. Tall Cabinet Construction:

a. Cabinet End Panels shall be 3/4", Oak veneer core plywood. End panels shall be doweled and glued to top and bottom panels.

b. Vertical Partitions shall be 3/4", Oak veneer core plywood.

c. Exposed edges of end panels, top and bottom panels, partitions, and shelves shall be edged with 3mm solid Oak edge banding.

d. Cabinet Top Panel shall be 1”, Oak veneer core plywood. Panel shall be set flush with cabinet ends, doweled and glued into place.

e. Cabinet Bottom Panel shall be 3/4”, Oak veneer core plywood. Panel shall be set flush with cabinet ends, doweled and glued into place.

f. Top Back Rail and Center Back Rail shall be 3" x 1" solid hardwood doweled and glued into end panels.

g. Bottom Back Rail shall be 4” x 3/4” hardwood veneer core plywood doweled and glued into end panels.

h. Recessed Bottom Front Toe Rail shall be 4” x 3/4” Oak veneer

core plywood doweled and glued into end panels.

i. Back Panel shall be 1/4” Oak plywood when cabinet interior is exposed and 1/4” hardboard when interior is semi-exposed. Back panels are recessed into grooved end panels and secured on four (4) sides.

j. Shelves shall be 1”, Oak veneer core plywood with one (1) center fixed shelf and four (4) adjustable shelves that are adjustable on 32mm centers, supported by four (4) nickel-plated steel pin and socket type shelf clips.

6. Drawers and Doors:

a. Drawer Fronts:

1) CLASSIC SERIES - Square Edge Partial Overlay Style.
2) 3/4", Oak composite core plywood and 3mm solid Oak edge band with a slight radius.
3) Drawer fronts and panel doors on each cabinet have vertical match grain cut from one (1) plywood panel as a Matching Front Set.

b. Drawer Box Body:

1) Front, sides, and back are 1/2” thick 9-ply Birch plywood.
2) Dovetail joinery all four (4) corners.
3) 1/4” thick white finished hardboard bottom.
4) Bottom is set in grooves on four (4) sides and hot-melt glued on underside.
5) Drawer box has clear chemical resistant finish.
6) Top edge of box is provided with FINISHED TOP CAP to conceal edge of veneer core.

c. Panel Doors – Base Cabinets:

1) CLASSIC SERIES: Square Edge Partial Overlay Style.
2) 3/4”, Oak composite core plywood and 3mm solid Oak edge band with a slight radius.
3) Panel doors and drawer fronts on each cabinet have vertical match grain cut from one (1) plywood panel as a Matching Front Set.

d. Panel Doors – Wall and Tall Cabinets:

1) CLASSIC SERIES: Square Edge Partial Overlay Style.
2) 3/4", Oak composite core plywood and 3mm solid Oak edge band with a slight radius.
3) Panel doors on each cabinet have vertical match grain cut from one (1) plywood panel as a Matching Front Set.

e. Framed Glass Doors – Wall and Tall Cabinets:

1) CLASSIC SERIES: Square Edge Partial Overlay Style.
2) 3/4" x 3” solid Oak top, bottom, and side rails, doweled and glued together, sanded for smooth fit, and edge detailed with a slight radius.
3) Tall Cabinet doors shall have a 3/4" x 6” wide solid Oak center rail.

7. Utility Tables (if indicated in drawings):

a. Tables shall be fully framed with 3/4" x 4” radius edged solid Oak apron rails with diagonal heavy-duty steel corner braces locked into grooves and screwed with four (4) screws to inner face of rails. Intermediate rails shall be solid hardwood.
b. Table legs shall be properly fitted into position and securely fastened to diagonal corner braces with nut, washer and 3-1/2” x 5/16” carriage bolt, completely running through the leg providing a positive system, whereby bolt can be tightened without depending upon screw holding power of the table legs. Legs shall be 2-1/4” square laminated solid Oak, thoroughly glued, and radius edged. Legs shall be equipped with rubber leg shoes, and adjustable nylon glides.
c. Available options, WHEN CALLED FOR, include drawers or book compartments, pedestal legs, leg stretchers, and casters.

2.04 LABORATORY GRADE WOOD FINISH

A. Prior to application of wood finish, component parts shall be carefully sanded and buffed in preparation for the finishing process.

1. Exposed wood surfaces shall receive a stain and sealer coat of synthetic resin. The product is then cured at elevated temperatures. After the sealer coat, the product shall be sanded, wiped clean, and then a double pass coat of chemical resistant synthetic resin shall be applied and cured at elevated temperatures.
2. Semi-exposed surfaces receive sealer coat and a double pass coat of chemically resistant synthetic resin.
3. Unexposed cabinet end panels receive a sealer coat.

B. Cabinet Wood Surface Finish Tests and Evaluation:

1. The final finished wood product shall meet the performance test requirements and evaluations described under Paragraph 8.0 Cabinet Surface Finish Tests found in Section 8-W-2014 of the SEFA Recommended Practices for Laboratory Grade Wood Casework.
2. Paragraph 8.1 Chemical Spot Test and 8.1.1 thru 8.1.3. This Test Procedure describes the testing of a RED OAK wood veneer panel without stain, using forty-nine (49) chemical reagents with each given a final rating system of Level 0, Level 1, Level 2, or Level 3. After testing, panel shall

have no more than four (4) Level 3 conditions.

3. Paragraph 8.2 Hot Water Test and 8.2.1 thru 8.2.3. This Test Procedure describes the testing of a RED OAK wood veneer panel without stain, using hot water with no visible effect.
4. The above Test Procedures shall be performed for Wood Casework Manufacturer by an Independent third party, SEFA approved, testing facility.

2.05 CASEWORK HARDWARE AND ACCESSORIES

A. Hinges: Institutional type, ground tip, five-knuckle, with pins of not less than .177” in diameter and leaves of not less than .095" thick. Hinges shall be 2-3/4” long wrought steel with chemical resistant epoxy powder coating. Two (2) hinges shall be provided on doors under 36" in height and three (3) hinges for doors 36" and over. Standard color of epoxy powder coat is Black. Chrome color of powder coat is available option.

B. Pulls: Solid metal, wire type, 4" long mounted with two (2) screws fastened from back. Pulls shall have chemical resistant epoxy powder coating to match hinges. Provide two (2) pulls for drawers over 24" wide. Standard color of epoxy powder coat is Black. Chrome color of powder coat is an available option.

C. Drawer Slides: Shall be easily removable with a 100 lb dynamic load rating, and have self-closing, 3/4 extension, epoxy powder coated steel, nylon rollers, bottom mount, positive stop features. File drawers shall have full extension, zinc plated anochrome finish, ball bearing, side mount slides with lever release.

D. Door Catches: Provide two (2), top and bottom, dual, self-aligning magnetic catches on base and wall cabinet doors, and two (2) heavy-duty magnetic catches on tall cabinet doors.

E. Elbow Catches: Brass with latch held by coiled compressing spring. Catch plates of 16-gauge plated steel. Provide on base and wall cabinets with double doors where locks are specified.

F. Spring Actuated Latch: Latch has 4-5/8" bevel slide bolt with 2-1/4 lbs./in. actuating spring. Provide on tall cabinets with double doors where locks are specified.

G. Leg Shoes: Molded vinyl or rubber, black, coved bottom type.

H. Glass: Type I, Class I, float glass.

I. Tote Trays: High impact molded plastic tray with high gloss.

J. Locks: PROVIDED ONLY IF SPECIFICALLY SHOWN ON DRAWINGS, OR INDICATED ON THE EQUIPMENT LIST, or where included in a product catalog number.

1. Locks are laboratory grade, cylinder cam locks, with 5-disc tumbler mechanism, and a dull chrome-plated face. Tumblers and keys are brass, while plug and cylinder are die cast zinc alloy. Locks are equipped with RemovaCoreTM keying control. With the use of a control key, the key core of the lock assembly can be removed and a new key core inserted, changing the entire locking system.

    a. Keying: Locks are keyed alike per room, but each room different and master keyed. Each lock in a room can be opened with one (1) key, but each room would have a different key, and all rooms can be opened with a single master key. Provide minimum of two (2) master keys per project.

2. When locks are shown on drawings or equipment list, and DESIGNATED AS BEING KEYED DIFFERENT, the following will be provided. Locks are keyed different and master keyed. Each lock is keyed different from all other locks. All locks in this group can be opened with one (1) master key. With keyed different locks, security panels are provided between drawers and between drawers and cupboards.

K. Sliding Doors (Frameless Glass - Wall Cabinets and Tall Cabinets): 1/4" thick float glass with polished edges. Doors operate on metal track applied at top and bottom front horizontal rails of cabinet. Doors easily removable for cleaning. Locks, when indicated, shall be showcase type.

L. Swinging Doors (Framed Glass - Wall and Tall Cabinets): 1/8" thick float glass on wall cabinets and 1/4” thick float glass on tall cabinets. Locks, when indicated, shall be cam type.

M. Sliding Doors (Framed Glass - Wall Cabinets): 1/8” thick float glass. Doors operate in overhead plastic track. Plastic track is applied to bottom and sized to allow cleaning space at each end. Locks, when indicated, shall be plunger bolt type.

2.06 WORK SURFACES, SINKS, AND ACCESSORIES

A. General:

1. Comply with physical and chemical resistance requirements for materials for tops, sinks, and accessories as specified herein and in accordance with SEFA 3-2010 Laboratory Work Surfaces.
2. Provide tops with smooth, clean, exposed surfaces and edges, in uniform plane, free of defects. **Provide 9” high x 1” thick back splash** and end splash where tops abut walls, or where shown on drawings.

    a. Top sizes: Furnish tops in longest practical lengths, in configuration indicated on the drawings.

B. Work Surfaces:

1. Epoxy Resin Tops (Shelresin): Shall consist of sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.

   a. Wall counters shall be monolithic throughout without surface coating application, and shall be flat and 1" thick with 1/8" chamfered exposed edges. Provide drip grooves under all exposed edges. Exposed corners shall be eased slightly for safety. Bond joints of tops and splashes with highly chemical resistant cement with properties and color similar to base material. Standard color is Black.

   b. Minimum Physical Properties and Test Results:

TEST	ASTM	IMPERIAL
Rockwell Hardness	D785-08	109 (M scale)
Density	D792-00	133 (lb/ft3)
Compressive Strength	D695-02	33.5 (kpsi)
Flexural Strength	D790-07	14.9 (kpsi)
Fire Resistance	D635-06	Self-Extinguishing
Water Absorption	D570-98	0.008 (% after 24 hrs)
Linear Thermal Expansion	D696-03	1.37x10-5 (in/in degree F)
Flame Spread Index	E84-06	0.29 (in)
Smoke Developed Index	E84-06	8.71 (in)

   c. Chemical Resistance Tests and Evaluation: Epoxy Resin Tops shall meet the performance test requirements and evaluations described under Paragraph 2.1.1 Chemical/Stain Resistance Test found in Section 3-2010 of the SEFA Recommended Practices for Laboratory Work Surfaces. Epoxy Resin Top material shall be tested using forty-nine (49) Reagents and shall result in no more than four (4) Level-3 conditions.

2. Phenolic Resin Tops: Shall be a compression molded composite of a homogeneous core of organic fiber reinforced phenolic, and may contain one or more integrally cured surfaces that are non-porous. Tops shall be 1" thick. Standard color is Black.
3. Fiberglass Reinforced Structural Polyester Resin Top with Integral sink and service turrets: Shall have acid resistant, durable gel coat surface, and semi-gloss sheen, to resist moderate chemicals, solvents, biological stains, heat and moisture. The Polyester resin shall be fire retardant, treated with Hydrated Alumina, and shall meet the requirements for NON-BURNING when submitted to the ASTM D-635 test.
4. Plastic Laminate Tops: Shall be thermosetting, high-pressure, plastic laminate sheet 1/16" thick, cemented to underlayment with a highly water

resistant resin adhesive. Underlayment shall have smooth surface, free of wood grain or other defects that would "telegraph" through to the top surface. Top shall be edge banded with same material as top, set under edge of top and cemented with a highly water resistant resin adhesive. Top thickness to be 1-1/4" unless noted otherwise.

PART 3 EXECUTION

3.01 EXAMINATION

A. The casework contractor shall verify that building conditions have been completed as described in 1.06 A and B which outline building readiness required before casework installation begins.

3.02 INSTALLATION

A. Installer Qualifications: The Installer shall have a minimum of five (5) years of experience installing laboratory casework using professional and accepted trade practices and be familiar with SEFA's Recommended Practices as described in SEFA 2-2010, and be certified by the manufacturer as having the necessary skills and equipment to install the casework so as not to void the warranty.

B. Coordination: Coordinate the work of this section with regard to installing casework. Cooperate with other trades regarding mechanical and electrical connections to casework that are provided in their work, including final connections to sinks, plumbing fixtures, electrical fixtures, fume hoods, etc.

C. Performance:

1. Casework:

   a. Set base cabinets in place, level, secure to walls or floors as necessary. Install fillers, trim and scribe to walls. Shim as required using concealed shims.
   b. Screw continuous cabinets together with joints flush, tight and uniform.
   c. Secure tall cabinets and wall cabinets to the walls. Secure these cabinets to solid supporting material, utilizing grounds/blocking that is provided in walls in another section of work.

2. Work Surfaces:

   a. Work surfaces shall be installed with nominal 1" overhang on the front and end, unless otherwise indicated on the shop drawings.
   b. Level and shim as necessary. Shims shall generally not exceed 1/8".
   c. Install work surfaces to achieve a uniform alignment of the front edge of the top.
   d. Only factory-prepared field joints, located per the shop drawings,

shall be permitted.

e. Secure work surfaces to the understructure with adhesive or mechanical fasteners per the manufacturer's recommendations.
f. Provide flush joints not to exceed 1/8" between work surface sections.
g. Grout butt joints with material and method per the manufacturer's recommendation.
h. Backsplashes and end returns shall be secured in place with joints sealed per manufacturer's recommendation.

3.03 ADJUST AND CLEAN-UP

A. Adjust doors and drawers to operate smoothly.

B. Clean casework and touch-up as required.

C. Clean work surfaces.

D. Remove all debris, dirt, rubbish, and excess material as a result of the installation of this equipment and leave the site clean and orderly.

3.04 PROTECTION

A. Protect countertops with Kraft paper or cardboard after installation to help prevent damage from other trades.

B. The General Contractor is responsible for protection of casework, work surfaces, and fixtures from damage by work of other trades.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The following specifications for Wood Laboratory Casework and related equipment outline the minimum requirements expected by the Owner and Architect on this project.

B. Section Includes:

1. Furnishing, delivering to the building, uncrating, setting in place, leveling, and anchoring all casework, countertops, equipment, and technical products listed in the specifications, equipment schedule or shown on the drawings.
2. Furnishing and installing filler panels and scribes as required for finished installation.
3. Furnishing laboratory service fixtures and fittings, as described in the specifications, equipment list or shown on the drawings, that are directly attached to the casework or equipment, complete with tank nipples and lock nuts for mounting on tops or curbs. Installation and final connections will be by other respective trades as part of their work.
4. Furnishing laboratory sinks and cup sinks, complete with threaded sink outlets, and required overflows, plugs, and strainers as described in the specifications, equipment list or shown on the drawings. Installation and final connections will be by other respective trades as part of their work.
5. Furnishing electrical service fixtures, as described in the specifications, equipment list or shown on the drawings, that are directly attached to the casework or equipment. Installation and final connections will be by other trades as part of their work.
6. Removal of all debris, dirt, and rubbish accumulated as a result of installation of this equipment, to an onsite container provided by others.

1.02 RELATED DIVISIONS AND SECTIONS

A. Section 06 10 00 – Rough Carpentry: Grounds/blocking provided within metal stud walls to adequately support wall mounted casework provided and installed in this section.

B. Section 09 65 13 – Resilient Flooring: Base molding for laboratory casework provided and installed in this section.

C. Section 11 53 00 – Laboratory Equipment: Specialized equipment described in this section and furnished in lab areas is provided and installed in this section of work.

D. Division 22 00 00 – Plumbing: Material and final connections for rough-ins, drain lines, vents, traps, tailpieces, service piping, shut-off valves, adapters, supports, in-line vacuum breakers, thermostatic mixing valves, etc. are provided and installed in this division for laboratory sinks, faucets, service fixtures, emergency showers, and fume hoods that are part of laboratory casework.

1. Laboratory fume hood superstructures are provided with internal service piping pre-piped by Hood manufacturer.

E. Division 23 00 00 – HVAC: Material and final connections for exhaust and supply fans, stacks, ductwork, elbows, supports, dampers, controls, duct collar adapters, etc. are provided in this division for laboratory casework fume hoods.

F. Division 26 00 00 – Electrical: Material and final connections for electrical rough-ins, junction boxes, conduit, wiring, etc. are provided in this division for laboratory casework electrical service fixtures.

1. Laboratory fume hood superstructures are provided with internal electrical conduit and wiring by Hood manufacturer that terminates on top of hood at junction box.

G. Division 27 00 00 – Communications: Voice, audio-video cabling, data and data outlets are provided in this division.

1.03 REFERENCES

A. ADAAG: 2004 Americans with Disabilities Act Accessibility Guidelines; Revised 2010 ADA Standards for Accessible Design.

B. ANSI/ISEA Z358.1-2014: Emergency Eyewash and Shower Equipment.

C. NFPA 30: Flammable and Combustible Liquids Code.

D. NFPA 45: Standard for Fire Protection for Laboratories Using Chemicals.

E. SEFA: Scientific Equipment and Furniture Association Recommended Practices. Desk Reference, 5th Edition, 2014. www.sefalabs.com

1. SEFA 1-2010: Recommended Practices for Fume Hoods.
2. SEFA 2-2010: Recommended Practices for Installation.
3. SEFA 3-2010: Recommended Practices for Work Surfaces.
4. SEFA 7-2010: Recommended Practices for Laboratory Service Fixtures.
5. SEFA 8-W-2014: Recommended Practices for Wood Laboratory Grade Casework.

F. California Air Resources Board; CARB Phase 2 Compliant.

G. ANSI/HPVA HP-1 2009: Hardwood Veneer Core Plywood.

H. ANSI A208.1-2009: Particleboard (PBC); Composite Panel.

I. ANSI A208.2-2009: Medium Density Fiberboard (MDF); Composite Panel.

J. UL-1805: Laboratory Fume Hoods.

K. ANSI/ASHRAE 110: Method of Testing Performance of Laboratory Fume Hoods as Manufactured.

1.04 SUBMITTALS

A. Refer to Section 01 33 00 for Submittal Procedures.

B. Shop Drawings: Submit shop drawings showing plans, service rough-Ins, elevations, sections, end views, service chases, countertop details, location and type of sinks and service fixtures, installation details, and location of grounds/blocking within walls for adequate wall cabinet reinforcement.

C. Manufacturer's Data:

1. Provide data indicating compliance with SEFA 8-W-2014, Laboratory Furniture Certificate of Performance Test from SEFA approved, Independent Test Facility.
2. Provide Test Report from SEFA approved, Independent Test Facility, certifying that wood casework finish complies with SEFA 8-W-2014, Chemical Resistance Testing requirements.

D. Selection Samples: Submit one (1) set of manufacturer's standard color chips for wood casework.

1.05 QUALITY ASSURANCE

A. All laboratory casework, including cabinetry, work surfaces, sinks, and accessories, service fixtures and fittings, fume hoods, and technical products should be provided by the Wood Laboratory Casework Manufacturer.

B. Provide certification that laboratory casework shall meet the performance requirements described in SEFA 8-W-2014.

1.06 PROJECT SITE CONDITIONS

A. Building should be enclosed and weather-tight. HVAC system should be operating and maintaining a temperature range of 65-80 deg F with relative humidity range of 30%-50% to maintain acceptable wood casework moisture content, and to prevent problems such as drawers swelling and doors warping.

B. Additional Conditions:

1. Required grounds/blocking in walls for reinforcement of wall-mounted cabinets must be in place.
2. If floor tile is required under casework, it must be in place.
3. Overhead ductwork, ceiling grid, tile, and light fixtures must be in place.
4. Wet operations should be complete.
5. Painting should be complete.
6. Service lines for water, gas, etc. must be flushed clean of dirt and chips, capped and tested for leaks prior to the Plumber's final connections.
7. Electrical service and lighting should be available in each room where casework will be installed.

C. Field Dimensions: Should be confirmed prior to product fabrication. General Contractor shall provide Guaranteed Dimensions if actual field dimensions are not available in time frame necessary to meet lead times for Laboratory Casework Manufacturer to produce and deliver to jobsite.

1.07 DELIVERY, STORAGE, HANDLING

A. Delivery: Products shall be delivered to the project site in undamaged condition, unloaded by casework installer, distributed to required rooms, unpackaged, and made ready for installation.

B. Storage: If rooms are not ready for installation, store product indoors, in ventilated areas with constant temperature range of 65-80 deg F, and range of relative humidity as noted in 1.06 A. Do not remove wrapping or packaging material. Laboratory Casework Manufacturer not responsible for off-site storage.

C. Handling: Use proper moving equipment to unload and distribute equipment and utilize personnel that are experienced in moving furniture and equipment.

D. Waste Disposal: Casework installers shall remove refuse resulting from their casework installation and place in trash container and leave installation site clean and free of debris. Trash container shall be provided by the General Contractor.

1.08 WARRANTY

A. Lifetime Warranty: Provide written warranty with close-out documents stating that this manufacturer shall guarantee that all Wood Casework provided on this contract to be free from defects in material and workmanship for the life of the product in the application and location installed. Purchaser shall notify manufacturer's representative immediately of any defective product. Manufacturer shall have a reasonable opportunity to inspect the goods. No product shall be returned without purchaser's receipt of written shipping instructions from the manufacturer.

B. Warranty Limitation: Casework must be installed by a factory certified installer or Lifetime Warranty shall be negated to a 2-Year Warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The products of Sheldon Laboratory Systems, Crystal Springs, MS are specified herein as the standard of quality required on this project. Tel: 601-892-2731.

B. The following Manufacturers are approved to Bid this project based on providing Wood Laboratory Casework and Technical Products as specified, unless they submit a list of Product Deviations to the architect at least ten (10) days prior to Bid Date and receive written approval by addendum to Bid on their deviations.

1. Sheldon Laboratory Systems
2. Labscape Furniture & Equipment
3. Diversified Casework

C. Qualifications of other Manufacturers seeking prior approval to bid this project.

1. Submit request to Architect at least ten (10) days prior to project bid date to allow adequate time for review.
2. Provide name, location, and description of Wood Laboratory Casework Manufacturer, including source and data of laboratory grade service fixtures, work surfaces and sinks, fume hoods, and technical products.
3. Provide list of five (5) installations of comparable size and scope completed within the past five (5) years, along with a contact name and phone number for each project.
4. Provide a list of product deviations to the Architect describing any differences between proposed products and specified products.
5. Provide products AS SPECIFIED, unless Deviations approved in writing.
6. Failure to submit product deviation list will result in Architect's assumption that proposed products DO NOT DEVIATE from specified products.
7. Provide certification that manufacturer's product complies with standards and test performance of SEFA 8-W-2014.

2.02 MATERIALS

A. General:

1. All casework shall be of modern design and shall be constructed in accordance with the recommended practices of the Scientific Equipment and Furniture Association. First class quality casework shall be established by use of modern machinery, tools, fixtures, and skilled workmanship.
2. The following definitions apply to wood laboratory casework units. Size and type of units is indicated on the drawings or equipment list.

    a. EXPOSED SURFACES of casework include exterior surfaces visible after installation when all doors and drawer fronts are

closed. Visible surfaces in open cases or behind clear glass doors shall be considered as exposed portions. Back of drawer fronts and panel doors shall be considered as exposed surfaces. Bottoms of wall hung cabinets shall be considered as exposed.

b. SEMI-EXPOSED SURFACES of casework shall include interior surfaces exposed to view only when opaque doors are open.

c. UNEXPOSED SURFACES not visible after installation include back rails, top side rails, stretchers, web frames, blocking, components concealed by drawers, underside of knee spaces and drawer aprons, and tops of 82” high tall and wall hung cabinets.

B. Casework Materials:

1. Materials used for construction of cabinets, cases and tables as specified herein shall meet or exceed the minimum standards as described.

a. All exterior surfaces exposed to view after installation, and all cabinet interior surfaces shall be Red Oak with the exception of back panels behind opaque doors which shall be Hardboard, drawer boxes which shall be Birch, and cabinet fronts which shall be Plastic Laminate.

b. All wood or plastic laminate panels with veneer core, particleboard core, or MDF core shall be CARB Phase 2 Compliant.

c. Exposed solid wood: Plain sawn Red Oak lumber, Grade FAS or better, clear and free of defects. Lumber shall be air dried, then kiln dried, and tempered to a moisture content of 6%-9% before use.

d. Unexposed solid wood: Other hardwoods may be used that are Grade FAS or better, clear and free of defects, and properly dried in same manner as exposed solid wood.

e. Plywood: Hardwood Veneer Core Plywood shall be minimum 3-ply (1/4”), 5-ply (1/2”), or 7-ply (3/4”) with select Red Oak, Grade A-1, plain sliced, book match veneer face and back, and shall be compliant with ANSI/HPVA HP-1 2009. All 9-ply (1”) plywood shall be Grade A-1, whole piece, rotary cut, oak veneer face and back. Use of other hardwood face veneer is acceptable in unexposed areas. Combination core with composite cross bands is acceptable in lieu of veneer core.

f. Panels: Composite Core Panels for Plastic Laminate cabinet fronts shall be compliant with ANSI A208.1-2009 (PBC) Standard. Minimum 45 lb. Industrial Grade.

g. Cabinet Fronts: Minimum 11/16” thick plastic laminate drawer front and door panels shall be high-pressure laminate with 3mm black PVC edge band.

h. Banding: Plywood panels shall be edge banded only where specified herein with 3mm solid Oak edge band.

i. Hardboard: Tempered hardboard shall be 1/4" thick. All hardboard

shall be composed of wood fibers and resinous binder compressed under heat and pressure.

j. Glass: Wall Cabinet framed swinging and framed sliding doors shall have 1/8” float glass. Wall Cabinet and Tall Cabinet frameless sliding doors shall have 1/4” float glass with polished edges. Tall Cabinet framed swinging doors shall have 1/4" float glass.

k. Tempered Glass: Tempered safety glass will be provided ONLY WHEN SPECIFICALLY CALLED FOR on the drawings or equipment list.

2.03 FABRICATION:

A. General:

1. The Wood Cabinetry selected for this project shall be as follows.

   a. Cabinet Front Style: ACCENT SERIES – Red Oak.
   b. Plastic Laminate drawer fronts and panel doors on Oak cabinets feature a square edge with slight radius, partial overlay style.
   c. Drawer fronts and panel doors on all Oak cabinets are high-pressure plastic laminate with black PVC edge band. Rear surface has matching cabinet liner. Pattern vertical match when feasible.
   d. ACCENT SERIES Laminate Color Selection: Select from Sheldon standard Plastic Laminate Color Selection Chart.

2. Cabinets, tables, and other units shall be of the size and configuration indicated on the drawings and/or equipment list. Wood cabinetry is bored, doweled, grooved, and rabbeted construction.
3. Base Cabinet Construction:

   a. Cabinet End Panels shall be 3/4", Oak veneer core plywood. End panels shall be doweled and glued to top frame members, intermediate rails, and bottoms.
   b. Vertical Partitions are 3/4", Oak veneer core plywood.
   c. Exposed or semi-exposed edges of end panels, partitions, bottom panels, and shelves shall be edged with 3mm solid Maple edge banding.
   d. Two-Piece Top Frame consists of nominal 1" X 3" solid Oak front rail, with back edge grooved to receive cross rails, and similar 1” X 3” solid Oak back rail, both set flush with cabinet ends, doweled and glued into place.
   e. Top Frame Cross Rails are nominal 1" X 2-1/4" solid hardwood fully housed into front and back rails with tongue and groove joints to form a full four-sided top frame. CROSS RAILS ARE ONLY PROVIDED IF SPECIFICALLY CALLED FOR.
   f. Intermediate Rails are provided on all base cabinets between drawer/drawer configurations and drawer/door configurations.

Rails are 1” X 3” solid Oak with back grooved to receive lock security panels (when panels are required). Rails shall be set flush with cabinet ends, doweled and glued into place.

g. Bottom Panel shall be 3/4”, Oak veneer core plywood. Panel shall be set flush with cabinet ends, doweled and glued into place.
h. Back Panel shall be 1/4" thick Oak plywood when cabinet interior is exposed and 1/4" hardboard when cabinet interior is semi-exposed. Backs are recessed into grooved end panels and secured on all four (4) sides.
i. Recessed Front Toe Rail shall be 4”x 3/4" Oak veneer core plywood.
j. Cabinet Shelves shall be 1”, Oak veneer core plywood. Shelves are adjustable on 32mm centers, supported by four (4) nickel-plated steel pin and socket type shelf clips.
k. Security Panels are 1/4" thick hardboard. Panel is provided between drawer/drawer and drawer/door base cabinets only when called for, OR WHEN LOCKS ARE SPECIFIED TO BE KEYED DIFFERENT.

4. Wall Cabinet Construction:

a. Cabinet End Panels shall be 3/4", Oak veneer core plywood. End panels shall be doweled and glued to top and bottom panels.
b. Vertical Partitions shall be 3/4", Oak veneer core plywood.
c. Exposed or semi-exposed edges of end panels, top and bottom panels, partitions, and shelves shall be edged with 3mm solid Oak edge banding.
d. Top and Bottom Panels shall be 1”, Oak veneer core plywood. Panels shall be set flush with cabinet ends, doweled and glued into place.
e. Back Panel shall be 1/4” Oak plywood when cabinet interior is exposed and 1/4" hardboard when interior is semi-exposed. Back panels shall be rabbeted into ends and secured on all (4) sides.
f. Cabinet Shelves shall be 1”, Oak veneer core plywood. Shelves are adjustable on 32mm centers and supported by four (4) nickel-plated steel pin and socket type shelf clips.
g. Top and Bottom Back Rail shall be 4” x 3/4" hardwood veneer core plywood doweled and glued into end panels, and used for attaching the cabinet to wall.

5. Tall Cabinet Construction:

a. Cabinet End Panels shall be 3/4", Oak veneer core plywood. End panels shall be doweled and glued to top and bottom panels.
b. Vertical Partitions shall be 3/4", Oak veneer core plywood.
c. Exposed edges of end panels, top and bottom panels, partitions, and shelves shall be edged with 3mm solid Oak edge banding.
d. Cabinet Top Panel shall be 1”, Oak veneer core plywood. Panel

shall be set flush with cabinet ends, doweled and glued into place.

e. Cabinet Bottom Panel shall be 3/4", Oak veneer core plywood. Panel shall be set flush with cabinet ends, doweled and glued into place.

f. Top Back Rail and Center Back Rail shall be 3" x 1" solid hardwood doweled and glued into end panels.

g. Bottom Back Rail shall be 4" x 3/4" hardwood veneer core plywood doweled and glued into end panels.

h. Recessed Bottom Front Toe Rail shall be 4" x 3/4" Oak veneer core plywood doweled and glued into end panels.

i. Back Panel shall be 1/4" Oak plywood when cabinet interior is exposed and 1/4" hardboard when interior is semi-exposed. Back panels are recessed into grooved end panels and secured on four (4) sides.

j. Shelves shall be 1", Oak veneer core plywood with one (1) center fixed shelf and four (4) adjustable shelves that are adjustable on 32mm centers, supported by four (4) nickel-plated steel pin and socket type shelf clips.

6. Drawers and Doors:

a. Drawer Fronts:

1) ACCENT SERIES - Square Edge Partial Overlay Style.
2) 11/16" thick Plastic Laminate composite core panel and 3mm black PVC edge band with a slight radius.

b. Drawer Box Body:

1) Front, sides, and back are 1/2" thick 9-ply Birch plywood.
2) Dovetail joinery all four (4) corners.
3) 1/4" thick white finished hardboard bottom.
4) Bottom is set in grooves on four (4) sides and hot-melt glued on underside.
5) Drawer box has clear chemical resistant finish.
6) Top edge of box is provided with FINISHED TOP CAP to conceal edge of veneer core.

c. Panel Doors – Base Cabinets:

1) ACCENT SERIES: Square Edge Partial Overlay Style.
2) 11/16" Plastic Laminate composite core panel and 3mm black PVC edge band with a slight radius.

d. Panel Doors – Wall and Tall Cabinets:

1) ACCENT SERIES: Square Edge Partial Overlay Style.

2) 11/16” Plastic Laminate composite core panel and 3mm black PVC edge band with a slight radius.

e. Framed Glass Doors – Wall and Tall Cabinets:

1) ACCENT SERIES: Square Edge Partial Overlay Style.
2) 11/16” Plastic Laminate composite core panel and 3mm black PVC edge band with a slight radius.
3) Tall Cabinet doors shall have a 6” wide center rail.

7. Utility Tables:

a. Tables shall be fully framed with 3/4" x 4” radius edged solid Oak apron rails with diagonal heavy-duty steel corner braces locked into grooves and screwed with four (4) screws to inner face of rails. Intermediate rails shall be solid hardwood.
b. Table legs shall be properly fitted into position and securely fastened to diagonal corner braces with nut, washer and 3-1/2” x 5/16” carriage bolt, completely running through the leg providing a positive system, whereby bolt can be tightened without depending upon screw holding power of the table legs. Legs shall be 2-1/4” square laminated solid Oak, thoroughly glued, and radius edged. Legs shall be equipped with rubber leg shoes, and adjustable nylon glides.
c. Available options, WHEN CALLED FOR, include drawers or book compartments, pedestal legs, leg stretchers, and casters.

2.04 LABORATORY GRADE WOOD FINISH

A. Prior to application of wood finish, component parts shall be carefully sanded and buffed in preparation for the finishing process.

1. Exposed wood surfaces shall receive a stain and sealer coat of synthetic resin. The product is then cured at elevated temperatures. After the sealer coat, the product shall be sanded, wiped clean, and then a double pass coat of chemical resistant synthetic resin shall be applied and cured at elevated temperatures.
2. Semi-exposed surfaces receive sealer coat and a double pass coat of chemically resistant synthetic resin.
3. Unexposed cabinet end panels receive a sealer coat.

B. Cabinet Wood Surface Finish Tests and Evaluation:

1. The final finished wood product shall meet the performance test requirements and evaluations described under Paragraph 8.0 Cabinet Surface Finish Tests found in Section 8-W-2014 of the SEFA Recommended Practices for Laboratory Grade Wood Casework.
2. Paragraph 8.1 Chemical Spot Test and 8.1.1 thru 8.1.3. This Test Procedure describes the testing of a RED OAK wood veneer panel without

stain, using forty-nine (49) chemical reagents with each given a final rating system of Level 0, Level 1, Level 2, or Level 3. After testing, panel shall have no more than four (4) Level 3 conditions.

3. Paragraph 8.2 Hot Water Test and 8.2.1 thru 8.2.3. This Test Procedure describes the testing of a RED OAK wood veneer panel without stain, using hot water with no visible effect.
4. The above Test Procedures shall be performed for Wood Casework Manufacturer by an Independent third party, SEFA approved, testing facility.

2.05 CASEWORK HARDWARE AND ACCESSORIES

A. Hinges: Institutional type, ground tip, five-knuckle, with pins of not less than .177” in diameter and leaves of not less than .095" thick. Hinges shall be 2-3/4” long wrought steel with chemical resistant epoxy powder coating. Two (2) hinges shall be provided on doors under 36" in height and three (3) hinges for doors 36" and over. Standard color of epoxy powder coat is Black.

B. Pulls: Solid metal, wire type, 4" long mounted with two (2) screws fastened from back. Pulls shall have chemical resistant epoxy powder coating to match hinges. Provide two (2) pulls for drawers over 24" wide. Standard color of epoxy powder coat is Black. Chrome color of powder coat is an available option.

C. Drawer Slides: Shall be easily removable with a 100 lb dynamic load rating, and have self-closing, 3/4 extension, epoxy powder coated steel, nylon rollers, bottom mount, positive stop features. File drawers shall have full extension, zinc plated anochrome finish, ball bearing, side mount slides with lever release.

D. Door Catches: Provide two (2), top and bottom, dual, self-aligning magnetic catches on base and wall cabinet doors, and two (2) heavy-duty magnetic catches on tall cabinet doors.

E. Elbow Catches: Brass with latch held by coiled compressing spring. Catch plates of 16-gauge plated steel. Provide on base and wall cabinets with double doors where locks are specified.

F. Spring Actuated Latch: Latch has 4-5/8" bevel slide bolt with 2-1/4 lbs./in. actuating spring. Provide on tall cabinets with double doors where locks are specified.

G. Leg Shoes: Molded vinyl or rubber, black, coved bottom type.

H. Glass: Type I, Class I, float glass.

I. Tote Trays: High impact molded plastic tray with high gloss.

J. Locks: PROVIDED ONLY IF SPECIFICALLY SHOWN ON DRAWINGS, OR INDICATED ON THE EQUIPMENT LIST, or where included in a product catalog

number.

1. Locks are laboratory grade, cylinder cam locks, with 5-disc tumbler mechanism, and a dull chrome-plated face. Tumblers and keys are brass, while plug and cylinder are die cast zinc alloy. Locks are equipped with RemovaCoreTM keying control. With the use of a control key, the key core of the lock assembly can be removed and a new key core inserted, changing the entire locking system.

    a. Keying Option - 1: All locks are keyed alike. Each lock is keyed the same as all other locks, and a single key can operate every lock.

    b. Keying Option - 2: Locks are keyed alike per room, but each room different and master keyed. Each lock in a room can be opened with one (1) key, but each room would have a different key, and all rooms can be opened with a single master key. Provide minimum of two (2) master keys per project.

2. When locks are shown on drawings or equipment list, and DESIGNATED AS BEING KEYED DIFFERENT, the following will be provided. Locks are keyed different and master keyed. Each lock is keyed different from all other locks. All locks in this group can be opened with one (1) master key. With keyed different locks, security panels are provided between drawers and between drawers and cupboards.

K. Sliding Doors (Frameless Glass - Wall Cabinets and Tall Cabinets): 1/4" thick float glass with polished edges. Doors operate on metal track applied at top and bottom front horizontal rails of cabinet. Doors easily removable for cleaning. Locks, when indicated, shall be showcase type.

L. Swinging Doors (Framed Glass - Wall and Tall Cabinets): 1/8" thick float glass on wall cabinets and 1/4” thick float glass on tall cabinets. Locks, when indicated, shall be cam type.

M. Sliding Doors (Framed Glass - Wall Cabinets): 1/8” thick float glass. Doors operate in overhead plastic track. Plastic track is applied to bottom and sized to allow cleaning space at each end. Locks, when indicated, shall be plunger bolt type.

2.06 WORK SURFACES, SINKS, AND ACCESSORIES

A. General:

1. Comply with physical and chemical resistance requirements for materials for tops, sinks, and accessories as specified herein and in accordance with SEFA 3-2010 Laboratory Work Surfaces.
2. Provide tops with smooth, clean, exposed surfaces and edges, in uniform plane, free of defects. Provide 4” high x 1” thick back splash and end

splash where tops abut walls, or where shown on drawings.

a. Top sizes: Furnish tops in longest practical lengths, in configuration indicated on the drawings.

B. Work Surfaces:

1. Epoxy Resin Tops (Shelresin): Shall consist of sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.

   a. Wall counters shall be monolithic throughout without surface coating application, and shall be flat and 1” thick with 1/8” chamfered exposed edges. Provide drip grooves under all exposed edges. Exposed corners shall be eased slightly for safety. Bond joints of tops and splashes with highly chemical resistant cement with properties and color similar to base material. Standard color is Black.

   b. Minimum Physical Properties and Test Results:

TEST	ASTM	IMPERIAL
Rockwell Hardness	D785-08	109 (M scale)
Density	D792-00	133 (lb/ft3)
Compressive Strength	D695-02	33.5 (kpsi)
Flexural Strength	D790-07	14.9 (kpsi)
Fire Resistance	D635-06	Self-Extinguishing
Water Absorption	D570-98	0.008 (% after 24 hrs)
Linear Thermal Expansion	D696-03	1.37x10-5 (in/in degree F)
Flame Spread Index	E84-06	0.29 (in)
Smoke Developed Index	E84-06	8.71 in)

   c. Chemical Resistance Tests and Evaluation: Epoxy Resin Tops shall meet the performance test requirements and evaluations described under Paragraph 2.1.1 Chemical/Stain Resistance Test found in Section 3-2010 of the SEFA Recommended Practices for Laboratory Work Surfaces. Epoxy Resin Top material shall be tested using forty-nine (49) Reagents and shall result in no more than four (4) Level-3 conditions.

2. Phenolic Resin Tops: Shall be a compression molded composite of a homogeneous core of organic fiber reinforced phenolic, and may contain one or more integrally cured surfaces that are non-porous. Tops shall be 1” thick. Standard color is Black.
3. Fiberglass Reinforced Structural Polyester Resin Top with Integral sink and service turrets: Shall have acid resistant, durable gel coat surface, and semi-gloss sheen, to resist moderate chemicals, solvents, biological

stains, heat and moisture. The Polyester resin shall be fire retardant, treated with Hydrated Alumina, and shall meet the requirements for NON-BURNING when submitted to the ASTM D-635 test.

4. Plastic Laminate Tops: Shall be thermosetting, high-pressure, plastic laminate sheet 1/16” thick, cemented to underlayment with a highly water resistant resin adhesive. Underlayment shall have smooth surface, free of wood grain or other defects that would "telegraph" through to the top surface. Top shall be edge banded with same material as top, set under edge of top and cemented with a highly water resistant resin adhesive. Top thickness to be 1-1/4" unless noted otherwise.

C. Sinks and Troughs:

1. Epoxy Resin Sinks (Shelresin): Shall be one-piece, molded construction. Sinks to be “drop-in” style with inside corners and bottoms coved for easy cleaning. Standard color of sink is Black.
2. Epoxy Resin Troughs (Shelresin): Trough for TEII Student Tables shall be one-piece, molded construction with integral raised service turrets. Trough to have inside corners and bottoms coved for easy cleaning, and shall have molded raised ribs to facilitate glassware drying. Standard color of trough is Black.
3. Stainless Steel Sinks: Shall be 18 gauge, type 304, unless otherwise called for. All exposed surfaces shall be finished in a No. 4 finish. Bottoms shall be pitched to drain.

D. Sink Outlets:

1. Epoxy Resin Sinks and Troughs and Fiberglass Sinks shall be provided with 1-1/2” dia. X 3” threaded polypropylene sink outlet with locknut, removable disc strainer, and sink stopper.
2. Stainless Steel Sinks shall be provided with 1-1/2” dia. crumb cup strainer with gasket and locknut.

2.07 LABORATORY SERVICE FIXTURES, FITTINGS, AND ACCESSORIES

A. Water Faucets and Valves:

1. Provide units that comply with SEFA 7 – 2010, Laboratory Service Fittings Recommended Practices, and also complying with ANSI/ASME 112.18.1-2005 and certified by CSA International under CAN/CSA B.125.1-05.
2. Provide units fabricated from cast or forged red brass unless otherwise indicated.
3. Provide fittings complete with threaded mounting shanks, locknuts, and washers. Include necessary flanges, escutcheons, extension rods, etc.
4. Provide units complying with ADA accessible requirements where indicated on the drawings or equipment list. Provide one (1) faucet with 4” wrist blade handles at ADA sinks.
5. All water faucets shall be provided with aerators unless specifically noted

to have serrated hose ends.

6. If serrated hose ends are designated on any water faucets, provide the unit with a vacuum breaker.
7. Water faucets shall have self-contained renewable compression valve units with stainless steel valve seats. Compression unit valve stem shall be sealed with molded TFE stem packing to prevent leakage. Provide color coded index discs.

B. Gas Fixtures:

1. Provide gas fittings in multiple service faucets, deck mounted turrets, or panel mounted flanges with forged brass lever handle, non-removable serrated hose end, color coded index discs, ball valve and INTERNAL CHECK VALVE (except vacuum service).
2. Provide ball valve with chrome plated ball and PTFE seals. Valve handle shall require no more than 5 lbs. of force to operate. Valve shall be factory tested at 125 PSI. Maximum working pressure is 75 PSI.

C. Vandal Resistant Multiple Service Combination Faucets shall be provided with the following construction features.

1. Multiple Service Combination Faucets main body shall be constructed of heavy duty, cast brass that is sufficient to resist bending and breakage.
2. Provide Aerators of vandal-resistant design.
3. Index discs shall be tamperproof and cemented in place.
4. Fittings for laboratory gases shall be provided with ball valve (for ADA) and INTERNAL CHECK VALVE (except vacuum) to prevent back flow into gas system.
5. Nuts shall be provided with set screws.
6. Provide cemented threaded connections.
7. Combination water/gas faucets shall have inlet shanks machined from solid brass bar stock and heavy wall steel pipe.

D. Quality Assurance:

1. All water faucets and service fixtures shall be fully assembled and factory tested prior to shipment.

E. Faucet and Fixture Finish:

1. All water faucets and service fixtures shall have BLACK powder coat epoxy finish.

F. Vandal-Resistant Multiple Service Combination Faucets:

1. Sheldon Unicast Faucet No. 80020:

    a. Combination cold water-gas fixture

b. Black powder coat epoxy finish
c. Color coded nylon handles for cold water
d. Vandal-resistant features
e. Wrist blade handles at ADA sinks
f. Internal check valve in gas fixtures

2. Sheldon Unimix Faucet No. 80030:

a. Combination hot water-cold water-gas fixture
b. Black powder coat epoxy finish
c. Color coded nylon handles for hot and cold water
d. Vandal-resistant features
e. Wrist blade handles at ADA sinks
f. Internal check valve in gas fixtures

G. Approved Equal:

1. WaterSaver Faucet Co. No. VR5300WSA:

a. Combination cold water-gas fixture
b. Black powder coat epoxy finish
c. Color coded nylon handles for cold water
d. Vandal-resistant features
e. Wrist blade handles at ADA sinks
f. Internal check valve in gas fixtures

2. WaterSaver Faucet Co. No. VR5800WSA:

a. Combination hot water-cold water-gas fixture
b. Black powder coat epoxy finish
c. Color coded nylon handles for hot and cold water
d. Vandal-resistant features
e. Wrist blade handles at ADA sinks
f. Internal check valve in gas fixtures

H. Electrical Fixtures:

1. Electrical Fixtures that are a part of, or installed in the lab casework shall be approved by the National Board of Underwriters and must conform to city and state building codes.
2. Knock-out boxes when indicated, shall be installed in the lab casework.
3. Receptacles shall be grounded type, 20-amp heavy-duty industrial grade.

PART 3 EXECUTION

3.01 EXAMINATION

A. The casework contractor shall verify that building conditions have been completed as described in 1.06 A and B which outline building readiness required before casework installation begins.

3.02 INSTALLATION

A. Installer Qualifications: The Installer shall have a minimum of five (5) years of experience installing laboratory casework using professional and accepted trade practices and be familiar with SEFA's Recommended Practices as described in SEFA 2-2010, and be certified by the manufacturer as having the necessary skills and equipment to install the casework so as not to void the warranty.

B. Coordination: Coordinate the work of this section with regard to installing casework. Cooperate with other trades regarding mechanical and electrical connections to casework that are provided in their work, including final connections to sinks, plumbing fixtures, electrical fixtures, fume hoods, etc.

C. Performance:

1. Casework:

    a. Set base cabinets in place, level, secure to walls or floors as necessary. Install fillers, trim and scribe to walls. Shim as required using concealed shims.
    b. Screw continuous cabinets together with joints flush, tight and uniform.
    c. Secure tall cabinets and wall cabinets to the walls. Secure these cabinets to solid supporting material, utilizing grounds/blocking that is provided in walls in another section of work.

2. Work Surfaces:

    a. Work surfaces shall be installed with nominal 1" overhang on the front and end, unless otherwise indicated on the shop drawings.
    b. Level and shim as necessary. Shims shall generally not exceed 1/8".
    c. Install work surfaces to achieve a uniform alignment of the front edge of the top.
    d. Only factory-prepared field joints, located per the shop drawings, shall be permitted.
    e. Secure work surfaces to the understructure with adhesive or mechanical fasteners per the manufacturer's recommendations.
    f. Provide flush joints not to exceed 1/8" between work surface sections.

g. Grout butt joints with material and method per the manufacturer's recommendation.
h. Backsplashes and end returns shall be secured in place with joints sealed per manufacturer's recommendation.

3.03 ADJUST AND CLEAN-UP

A. Adjust doors and drawers to operate smoothly.

B. Clean casework and touch-up as required.

C. Clean work surfaces.

D. Remove all debris, dirt, rubbish, and excess material as a result of the installation of this equipment and leave the site clean and orderly.

3.04 PROTECTION

A. Protect countertops with Kraft paper or cardboard after installation to help prevent damage from other trades.

B. The General Contractor is responsible for protection of casework, work surfaces, and fixtures from damage by work of other trades.

END OF SECTION

THERMAL & ACOUSTICAL INSULATION

Section 07 21 00
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry.

B. Division 15: Duct and Pipe Insulation.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Installer's/Applicator's Qualifications: Company with a minimum of two years in performing work of this section and certified by manufacturer as an approved Installer/Applicator.

E. Volatile Organic Compound (VOC) Emissions: Provide products complying with GREENGUARD Product Emission Standard for Children and Schools.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Executed Guarantee of Contractor/Subcontractor per Article 1.05.

C. Product Data: Submit data on product characteristics, performance criteria, and limitations, including the following:
   1. General installation/application instruction.
   2. Environmental conditions required for installation and installation techniques.
   3. Safety requirements for application of products.

D. Installer's/Applicator's Qualifications: Submit copy of Installer's/Applicator's certification from manufacturer.

E. Sustainable Design: Provide manufacturer's certificates prepared by an independent, third party certifying to the following:
   1. Recycled material content for products with recycled content.
   2. Volatile organic compound content for each interior adhesive and sealant and related primer.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. California Quality Standards for Insulating Materials.

C. ASTM Standard C-665.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's original sealed packaging and/or original bundles with tags and labels intact.

B. Storage: Store and protect products in accordance with manufacturer's instructions. Store with seals and labels intact and legible. Store inside and in a dry location. Protect insulation materials from moisture and soiling. Provide ventilation to prevent condensation and degradation of products.

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

PART 2 - PRODUCTS

2.01 PRODUCT STANDARDS

A. **During construction operations, if walls or ceiling are open and insulation needs to be installed due to damaged or missing insulation, use the following specifications as a guideline.** References to manufacturer's names and products are to facilitate establishing level of quality, function and method of application.

B. Thermal Resistance Value (R): Thermal resistance calculated on value of material itself, without regard to location or method of installation.

1. Batt Insulation. (Unless specifically noted otherwise.)

a. For ceilings and ceiling/roof:
- Minimum R-value shall equal 38

.

b. For framed walls,
- Minimum R-Value, Thickness 3-1/2 Inches: R-13.
- Minimum R-Value, Thickness 5-1/2 Inches: R-21.5.

2. Board Insulation. (Unless specifically noted otherwise.)

a. For roof, R shall equal 14.3.

b. For furred masonry walls, R shall equal 10.

2.02 MATERIALS

A. Owens Corning, or approved equal, Batt Thermal Insulation (walls and ceiling/roof assemblies):

1. Batt Insulation, Unfaced: ASTM C 665, Type I, preformed glass fiber batt type, unfaced.
2. Batt Insulation, Kraft Faced: ASTM C 665, Type II, Class C preformed glass fiber batt type, Kraft paper faced one side.
3. Batt Insulation, Foil Faced: ASTM C 665, Type II, Class B preformed glass fiber batt type, foil faced one side with maximum flame/smoke properties of 75/450 in accordance with ASTM E84.

B. Batt Sound Insulation: Owens-Corning unfaced glass fiber acoustical insulation or approved equal, complying with ASTM C-665, Type 1. Batts to be full depth of studs. Flame spread and smoke density shall conform to CBC 707 and ASTM E-84, FHC 25/50 or less.

F. Vapor Barrier: All insulation shall have an integral vapor barrier on inside face unless otherwise noted. Vapor barrier shall have vapor permeance of not more than one perm when tested in accord with ASTM E-96. All insulation materials including facings installed within floor-ceiling assemblies, roof-ceiling assemblies, walls, crawl spaces or attics shall have a flame-speed rating not to exceed 25 and a smoke density not to exceed 450 as per CBC 707.

G. Sink and Lavatory Drain and Supply Pipe Insulation Wrap: Exposed drain and supply plumbing lines under sink and vanities shall be wrapped with insulation wrap as specified in the Division 22 Plumbing Fixtures specifications. Install to a neat and uniform appearance. Wrap shall be white and washable.

2.03 ACCESSORIES

A. All other materials, such as additional insulation materials, fasteners, line wire, tape and retainers, not specifically described but required for a complete and proper installation of building insulation, shall be as selected by the Contractor subject to submittal approvals. Accessories: Provide accessories per insulating system manufacturer's recommendations, including the following:

1. Tape: Polyethylene self-adhering type for Kraft faced insulation and bright aluminum self-adhering type for foil faced insulation.
2. Insulation Fasteners: Impale clip of galvanized steel; type recommended by insulation manufacturer for particular use intended.
3. Mechanical Insulation Fasteners: FM approved, corrosion resistant, size required to suit application.
4. Wire Mesh: Galvanized steel, hexagonal wire mesh.
5. Spindle Fasteners: Corrosion-resistant wire spindles.
6. Ventilation Baffles: Formed plastic, metal, or cardboard sized to fit full width of rafter spaces..

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, flashing conditions, penetrations, adjoining construction and the conditions under which work is to be installed. Verify that surfaces are dry and free of oil, grease, dust, rust, or other contaminant.

B. Report unacceptable conditions in writing. Do not proceed with the Work until unsatisfactory conditions have been corrected and surfaces are acceptable.

C. Verify that fire stopping is in place before beginning to apply the air infiltration barrier with flexible seal technology.

D. Verify the following conditions have been sealed with the air infiltration barrier before installing insulation and before closing in framing cavities:

1. Gaps between window units and framing.

2. Gaps between door heads, jambs, and sills and wall framing.

3. Interface of foundation or slab and sill plate.

4. Interface of band joists or rim joists and plates and subfloor.

5. Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space.

E. Verify the following work is complete before installing insulation and before closing in framing cavities:

1. Vapor retarder or air barrier is installed at fireplace walls.

2. Air sealing is provided between the garage and conditioned spaces.

3. Vapor retarder or air barrier is installed in common walls between dwelling units.

4. Recessed light fixtures are air tight, IC rated, and sealed to gypsum board.

    a. Exception: Light fixtures in locations with conditioned spaces on both sides do not need to be air tight and do not need to be sealed unless required by another Section in the Project Manual.

3.02 PREPARATION

A. Provide thermal insulation at all exterior walls, interior partitions noted on Drawings to be insulated, and masonry walls as indicated, at all wood ceiling joists below roof areas, at all acoustical suspended ceilings and other locations indicated, including metal decks. Insulation in walls shall extend the full length of all exterior walls and vertically to the highest adjacent roof/ceiling. Install wall and ceiling insulation to create complete thermal enclosure

around habitated space.

B. Provide sound insulation at toilet walls adjoining other rooms, toilet chase wall and as indicated on drawings. Extend vertically to highest adjacent roof/ceiling.

C. Before beginning work, protect windows, plumbing fixtures, finish materials, and finish surfaces within work area from overspray by covering them with a plastic film. Secure edges of film to assure air infiltration barrier with flexible seal technology does not get behind the film.

D. Sweep area to receive air infiltration barrier application to remove dust and other contaminants that will interfere with providing a thorough seal.

E. Fill medium-sized gaps (gaps between 3/8 inch and 3 inches) between surfaces to be sprayed with fiberglass insulation. Cover gaps greater than 3 inches with rigid, nonporous material such as gypsum board, , extruded polystyrene insulation, sheathing, OSB, particle board, agrifiber particle board, or plywood secured to framing and apply sealant at the perimeter.

F. Comply fully with OSHA regulations regarding protective clothing, breathing apparatus, ventilation, and restricting access to areas of application.

3.03 INSTALLATION OF BATT OR BLANKET INSULATION

A. Wood joist ceilings: Install thermal insulation batts or blankets between joists with snug fit at sides and firmly butted ends with no open space at perimeter or in between. Staple insulation to sides of joists at 4" spacing through bent down flanges of vapor barrier in such manner that air leaks between insulation and joists are minimized.

B. Exterior stud walls: Install thermal insulation in same manner as specified for wood joist ceilings, by stapling flanges of vapor barrier to sides of wood studs.

C. Suspended ceilings: Place on top of suspended ceiling materials, including light fixtures. Suspend on wire supports such that 6 inches minimum clearance is maintained between light fixture and insulation. Fit snugly between ceiling supports and at edges and ends so air leaks are minimized. Extend 12 inches beyond wall lines of rooms to be insulated. Where walls or plenum barriers extend above ceiling, place 12 inch width of batt on opposite side, adjacent to wall or plenum barrier.

D. Sound insulated walls: Fill between studs where shown; Pack completely, free from gaps and voids; Cut and pack around pipes, etc.

3.05 PROTECTION

A. Protect installed insulation from damage until covered.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 07 92 00 Joint Sealants

B. Section 08 11 13 Hollow Metal Doors and Frames

C. Section 09 91 13 Exterior Painting

D. Section 09 91 23 Interior Painting

1.03 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions and maintenance instructions.

C. Samples: The following examples are required. Submit per Section 01 33 00.
   1. Panel makeup - 2 samples - 10"x10"
   2. Two samples of each color and finish texture - 3"x5"
   3. Manufacturer's full range of colors for Architect's selection

D. Submission Drawings: Indicate thickness, dimension and components of parts. Detail glazing methods, framing and tolerances to accommodate thermal movement.

E. Substitutions:
   1. Requests for substitutions will be considered in accordance with provisions of Section 01 30 00.
   2. The materials and products specified in this section establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution
   3. Each request shall include the name of the materials and a complete description of the proposed material, including test performance and any other information necessary for evaluation.

F. Affidavit certifying materials meet all requirements as specified.

G. 2 copies of manufacturers standard literature for specified material.

H. Submit executed Guarantee of Contractor/Subcontractor per article 1.04.

1.04 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Panel Lamination Warranty: Five years commencing on Date of Substantial Completion.

D. Finish Warranty: Kynar 500: Twenty years.

1.05 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. ASTM E84 - Surface Burning Characteristics.

C. ASTM E330-84: Structural Performance of Exterior Windows, Curtain Walls and Doors under the influence of wind loads.

D. ASTM D1781 - Climbing Drum Peel for Adhesives.

E. ASTM D3363-74: Method for Film Hardness by Pencil Test.

F. ASTM E72 - Strength Tests for Panels for Building Construction.

G. ASTM D2794-90: Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

H. ASTM D3359-90: Method for Measuring Adhesion by the tape test.

I. AA-C22-A41: Anodized Clear

J. AA-C22-A42: Integral Color Anodized

K. 603.8-92 Pigmented Organic Coatings on Aluminum (Polyester)

L. 605.2-92 High Performance Organic Coatings on Aluminum - (Kynar)

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer’s sealed containers and/or original bundles with tags and labels intact.

B. Protect finish and edge in accordance with panel manufacturer's recommendations.

C. Store materials in accordance with panel manufacturer's recommendations.

D. Store materials in protected, dry conditions off ground and in areas so as to not interfere with the progress of the work. Storage and Protection: Stack materials on platforms or pallets, covered with suitable ventilated covering. Store materials protected from exposure to harmful

environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

E. Transport, store and handle in strict accord with the manufacturer's written recommendations.

F. Make deliver to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) recommended by manufacturer. Do not install products under environmental conditions outside manufacturer's absolute limits).

1.08 QUALIFICATIONS/QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have a minimum of 25 years experience in the manufacture of composite wall panels.

B. Maximum deviation from vertical and horizontal alignment of installed panels is 1/8" (3mm) in 20' (6m) non-commutative.

C. Subcontractor is to make and be responsible for all field dimensions necessary for proper fitting and completion of work of this section. Report discrepancies to General Contractor before proceeding.

1.09 PROJECT RECORD DOCUMENTS

A. Provide per Section 01 77 00, Contract Closeout.

PART 2 - PRODUCTS

2.01 MANUFACTURER

Manufacturer: Mapes Architectural Panels, LLC, Lincoln, NE or approved equal. Panels consist of metal skins laminated to stabilizer substrates with an insulating core material. Panels are designed to be glazed into a window system or curtain wall system.

2.02 METAL WALL PANELS

A. Metal Wall Panels: Laminated metal faced Mapes-R panels as manufactured by Mapes Industries, Inc.

B. Finishes:
1. Exterior: Smooth Primed Aluminum.
2. Interior: Smooth Primed Aluminum.
3. Color as selected by architect.

C. Panel Fabrication
   1. Exterior substrate: Tempered Hardboard
   2. Core: Isocyanurate
   3. Interior substrate: Tempered Hardboard
   4. Tolerances: .8% of panels dimension length and width +- 1/16” thickness
   5. Panel thickness: 1.00 inch
   6. R-Value: 6.41
   7. U-Value: 0.15

D. Accessories
   1. Related material to complete installation as recommended by the manufacturer for use as an infill panel component in window and curtain wall systems
   2. Seals against moisture intrusion as recommended by manufacturer: Polyurethane and silicone-based sealant with a 20 year life are recommended.

2.03 METAL WINDOW PANELS

A. Metal Window Panels: Laminated metal faced veneer and glazing panels as manufactured by Mapes Architectural Panels, LLC, Lincoln NE or approved equal. Acceptable alternatives would include panels having similar composite construction and finish and published warranties.

B. Finishes:
   1. Exterior: Smooth Primed Aluminum
   2. Interior: Smooth Mill Aluminum
   3. Color as selected by architect.

C. Panel Fabrication
   1. Exterior Substrate: N/A
   2. Core: Tempered Hardboard
   3. Interior Substrate: N/A
   4. Tolerances - .8% of panels dimension length and width - (+/-) 1/16" thickness
   5. Panel Thickness - 0.25"
   6. R-Value - N/A
   7. U-Value - N/A

D. Accessories: As recommended for use as an infill panel component in window and curtain wall systems. Related material to complete installation as recommended by the manufacturer. Seals against moisture intrusion as recommended by the manufacturer. Polyurethane and silicone based sealant with a 20 year life are recommended.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation of this work, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify substrate conditions prior to installation to determine if they have been properly prepared. Verify that site conditions are acceptable for infill or glazing panel systems.

C. Verify that specified items may be installed in accordance with the approved design.

D. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Comply with manufacturer's product data including product technical bulletins, product catalog installation instructions, and product carton instructions.

D. Surfaces to receive panels shall be even, smooth, sound, clean, and free from defects detrimental to panel installation.

E. Field measure and verify dimensions as required.

F. Protect adjacent areas or surfaces from damage as a result of the Work of this Section.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Erect panels plumb, level and true.

C. Glaze panels securely and in accordance with approved shop drawings and manufacturers' instructions to allow for necessary thermal movement and structural support.

D. Do not install panels that are observed to be defective including warped, bowed, dented, scratched and delaminating components.

E. Conform to panel manufacturer's instructions for attachment systems.

F. Weather seal all joints as required using methods and materials as recommended by the panel manufacturer.

G. Separate dissimilar metals using gasketed fasteners and blocking to eliminate the possibility of electrolytic reaction.

H. Maximum deviation from vertical and horizontal alignment of erected panels shall be no more than 1/4 inch in 20 feet (1 mm in 1 m).

3.04 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. Remove temporary coverings and protection to adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.

C. Remove and legally dispose of construction debris from project site.

D. Protect installed products until completion of project.

E. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 CLEANING

A. After installation, clean all surfaces of plaster, paint and other contaminants in accordance with manufacturer's recommendations.

B. Weep holes and drainage channels must be unobstructed and free from dirt and sealant.

C. Remove protective materials and clean exposed surfaces in accordance with manufacturer's directions. Leave entire installation clean and free from defects.

END OF SECTION

SINGLE PLY ROOFING MEMBRANE

Section 07 54 20
21-32-051

1.GENERAL

1. INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

2. RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00 - Rough Carpentry.

B. Section 07 21 00 - Building Insulation.

C. Section 07 62 00 - Sheet Metal Flashing and Trim.

3. REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

4. SUMMARY

A. Section includes a mechanically attached Solar Bright 60 Evaloy KEE single ply roofing system. **The purpose of this specification is to provide single ply membrane product & installation guidelines for replacement of existing single ply roofing where alteration, removal and patch back are required for installation of new roof mounted equipment that is a part of this contract. Contractor is responsible for field verifying the existing single ply membrane roofing systems so that any repair, flashing or patch-back roofing scope is compatible with existing roofing systems and new roofing scope can be warranted.**

1. Install Rigid Polyisocyanurate Roof Insulation: 2" thick. (if existing system dictates)
2. Install polyiso insulation board tapered crickets as shown on plans.(if existing system dictates)
3. Install ¼" dens dek roof board. (if existing system dictates)
4. Install 60 mil KEE membrane as specified. (if this is the proper and compatible membrane with existing system.)
5.

5. SUBMITTALS

A. Refer to Section 01 33 00.

B. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements. Samples: Submit two (2) samples of the following:

1. Membrane
2. Fasteners

3. Insulation

C. Specimen Warranty: Provide an unexecuted copy of the warranty (as available for this scope) specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.

D. Certificates: Cool Roofing certified by Cool Roof Rating Council.

E. Shop Drawings: For roofing system. Include plans, elevations, sections, details and attachments to other Work.

F. Samples: If specifically requested for specified products; required for alternate products.

G. Installer Qualifications: Provide evidence that installers meet the requirements of Article 1.4.

H. Closeout Submittals:

1. O & M Manuals: Maintenance instructions.
2. Guarantee: Provide completed form per Article 1.5.
3. Manufacturer's weekly inspection reports noting issues, corrections, and final inspection photos.

6. QUALITY ASSURANCE

A. Installer Qualifications:

1. Minimum of 5 years of experience on similar work; knowledge and understanding of standards referenced herein; skill necessary to perform in compliance with this specification. Installers failing to demonstrate the required experience, knowledge, or skill shall be removed from the project.
2. Factory trained and approved applicator.
3. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
4. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.

B. Testing Characteristics: UL Class A roof; I-90 wind uplift.

C. Applicator-Manufacturer Review: Provide Drawings and Specifications review by Applicator with agent of roofing manufacturer; obtain manufacturer's agreement that specified system is proper for application shown.

D. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.

E. When the Project is in progress, the roofing system manufacturer will provide the following:

1. Report progress and quality of the work as observed.
2. Provide job site inspections a minimum of two (2) days a week throughout the course of construction.
3. Provide electronic inspection reports submitted weekly to the Owner and/or Architect.
4. Report to the Architect and/or Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
5. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

7. WARRANTY

A.

B. Installer: Provide in required form for a period of two (2) years from date of acceptance by Owner.

2.PRODUCTS

1. SINGLE-PLY MEMBRANE ROOFING

1. Acceptable Products:
   a. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this section.
   b. The design is based upon roofing systems by The Garland Company Inc./CI, Local representative Richard Jones (559) 647-1196
      1) Solar Bright 60 KEE Membrane (ASTM D 751)
      2) Membrane Thickness: (ASTM D 751) 60 mil nominal.
      3) Breaking Strength (ASTM D 751): 515 lbf/in
      4) Tearing Strength (ASTM D 751): 275 lbf/in
      5) Factory Seam Strength (ASTM D 751) 90 lbf
      6) Solar Reflectivity (ASTM E 903) 81%
      7) Emissivity (ASTM E 903) 95%
      8) Aged Solar Reflectance ≥ 0.63
      9) Thermal Emittance ≥ 0.75
      10) SRI minimum of 75.
      11) Alternate Products: Owner and Architect Approved Equal
      12) Parapet Wall Covering: 0.060 inch thick.

2. NAILERS

A. Douglas Fir; No. 2 or better, pressure treated; no creosote or asphalt preservatives allowed.

3. ROOF BOARD INSULATION

A. Thermal Insulation Properties and Approved Insulation Boards.

1. Rigid Polyisocyanurate Roof Insulation; ASTM C1289:
   a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
   b. Thickness: Minimum 2”
   c. R-Value: Minimum 11
   d. Compliances: UL, WH or FM listed under Roofing Systems:

B. Roof Insulation top layer: Dens Dek or equal roof board 4’ x 8’ max dimension.

1. Thickness: 1/4”inch, per Section 07 22 00.
2. Attachment Method: Adhered in manufacturers insulation adhesive.

C. Tapered Insulation: Tapered Hunter Panels or equal insulation board to be used as required for tapered insulation system.

1. Field Slope: N/A inch per foot.
2. Sump Slope: 1/2 inch per foot.
3. Cricket Slope: 1/2 inch per foot.
4. Attachment Method: Mechanically fastened

4. FASTENERS

A. Heavy duty #15 threaded fastener with a #3 Phillips drive used with Fastening Plate to secure Mechanically Fastened Roofing Systems. It is used on minimum 22 gauge steel decks or minimum 15/32" CDX plywood decks. It is also designed to offer an optimum combination of driving performance, back-out and corrosion resistance with excellent pullout performance.

B. Fastening Plate: A 2-3/8" diameter metal barbed fastening plate used with HP-X, CD-10 or HD 14-10 Fasteners for membrane or insulation securement. This plate can be used for membrane or insulation securement on Mechanically Fastened Roofing Systems.

C. Insulation Fastening Plate: A nominal 3-inch metal plate used for insulation attachment in conjunction with the appropriate fastener.

D. Nails: SFS 2-1/4 inch long wood deck fastener with domed convex stress plate, or No. 14 1-5/8 inch long fastener with 2 inch round metal barbed stress plate.

5. ACCESSORIES

A. Solar Bright 60 membrane shall be used for all flashing requirements to match the field membrane and warranty expectations selected for the roofing system.

B. Solar Bright 60 Inside Corners: Pre-molded corner flashing for inside corners. 80 mil thickness. Color - White.

C. Solar Bright Outside Corners: Pre-molded corner flashing for outside corners. 80 mil thickness. Color - White.

D. Solar Bright T-Joint Covers: 40 mil thick non-reinforced PVC flashing cut into a 4.5 inch (114mm) diameter circle used to seal step-offs at splice intersections.

E. Solar Bright Pipe Flashings: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 1 inch to 6 inch (25 - 152mm) diameter pipes.

F. Solar Bright Split Pipe Seals: Pre-fabricated flashing consisting of 80 mil reinforced Membrane for pipes 1 inch to 6 inch (25 - 152mm) in diameter. A split (cut) and overlap tab are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.

G. Solar Bright Non-Reinforced Flashing: 80 mil thick rolls 12 inches and 24 inches wide. Used for inside/outside corners and field fabricated pipe flashings when use of pre-molded accessories is not feasible.

H. Solar Bright Heat Weldable Walkway Rolls: offering superior tear, puncture and weather resistance and designed to protect membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 36 inches (914mm) wide by 60 feet (18.3 M) long and are nominal 80 mils thick.

I. Single ply Coated Sheet Metal: Provide where flashing, gravel stops and sheet metal are in contact with Single -ply roofing membrane.

6. SOLVENT, SEALANT, AND ADHESIVES

A. As recommended by manufacturer.

B. SolarBright VOC Bonding Adhesive: Solvent-based contact adhesive that allows bonding of membrane to various porous and non-porous substrates.
1. Base: Synthetic Rubber.
2. Color: Pale Yellow.
3. Solids: 24.2 percent.

7. INSPECTION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

D. Do not commence Work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

8. PREPARATION

A. Do not apply wet roofing, on wet application surface, or when temperature of deck less than 50 degrees F.

B. Provide entire roof system including treated wood nailers, Single-ply coated sheet metal, and coordination of items such as roof drains, sumps, jacks, etc.

C. Protect adjoining materials from stains particularly around perimeter of building; prevent debris from clogging roof drains.

D. Deck surface swept clean and dry; keep free of loose and foreign materials.

9. INSTALLATION

A. Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

1. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.
2. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.
3. Securely attach insulation to the roof deck for Adhered or Mechanically Fastened Roofing Systems. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by Factory Mutual (FM I-90) & the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

B. Application; Adhered system over roof deck

10. Position SolarBright membrane over the acceptable substrate. Fold membrane sheet back lengthwise so half the underside of the membrane is exposed.

11. Apply SolarBright Bonding Adhesive in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.

12. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.

13. Fold back the unbonded half of the sheet lengthwise and repeat the bonding procedures.

14. Position adjoining sheets to allow a minimum overlap of 2 inches (51mm).

15. Hot-air weld the SolarBright membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.

16. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches (51mm) and complete the bonding procedures as stated previously.

17. Parapet Wall Covering: Install as shown, extend to full height of parapet; lap under parapet cap flashing and over wall substrate 2 inches minimum on the back side of the wall. Secure in adhesive and attach at 9" on center on the outside face to assure a completely watertight installation.

18. Walkway: Per manufacturer's instructions and as shown on drawings. If drawings do not show walkways a minimum required will be;

    a. A path from the main roof access point to and around all HVAC units, to and around all serviceable roof top equipment, to and around all roof hatches, to and around all access points as designated by the owner, and as needed for protection of the roofing system will have walkway installed.

    b. All support blocking will have walkway pad installed as a protection mat.

C. Fasteners:

1. General: Per manufacturer's recommendation; fastening length and pattern based on performance values supplied by the fastener/disc manufacturer and conforming to Factory Mutual I-90 fastening pattern.
2. Walkway Fastening: Provide 2 inch continuous heat weld strip around perimeter of membrane.

D. Hot Air Welding

1. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.
2. All field seams must be clean and dry prior to initiating any field welding.
3. Remove foreign materials from the seams (dirt, oils, etc.) with Acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder**. Do not use denim or synthetic rags for cleaning.**
4. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.
5. Contaminated areas within a seam will inhibit proper welding and will require a membrane patch

E. Hand Welding

1. The lap or seam area of the membrane should be intermittently tack welded to hold the membrane in place.
2. The back "interior" edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
3. The nozzle of the hand held hot air welder shall be inserted into the lap at a 45° angle to the lap. Once the polymer on the material begins to flow, a hand roller shall be use to apply pressure at a right angle to the tip of the hand welder. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.
4. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch weld.

F. Automatic Machine Welding

1. Follow all manufacturers' instructions for the safe operation of the automatic welder.
2. Follow local code requirements for electric supply, grounding and surge protection.
3. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
4. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.

G. Inspection

1. The job foreman and/or supervisor shall initiate daily inspections of all completed work which shall include, but is not limited to the probing of all field welding with a dull pointed instrument to assure the quality of the application and ensure that any equipment or operator deficiencies are immediately resolved.
2. Ensure that all aspects of the installation (sheet layout, attachment, welding, flashing details, etc.) are in strict accordance with the most current Solar Bright Roofing Systems Specifications and Details.
3. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted at time of FINAL INSPECTION FOR WARRANTY ACCEPTANCE.

H. Metal Flashings:

1. General: Fabricate and install per Section 07 - FLASHING AND SHEET METAL, as shown and per manufacturer's recommendations. Install PVC coated metal flashing at intersections of roofs with sloped or vertical surfaces, roof interruptions and penetrations.
2. Base Flashing: Extend up vertical surfaces 6 inches, minimum, and onto the horizontal roof surfaces not less than 3 inches, unless otherwise noted. Provide PVC coated metal flashing with 2 inches minimum overlap of roofing membrane; heat weld in the horizontal plane, with subsequent sealing of seams with sealant.
3. All perimeter edge details are to be fabricated from Garland/CI SolarBright Clad Metal and incorporate 22 gauge cleat flashing.
4. Ensure all fascia extend a minimum of 2 inch lower than the bottom of the wood nailers.
5. Fasten all metal flashing to wood nailers or approved substrate with approved fasteners 8 inches on center.

6. Break and install Solar Bright Clad metal in accordance with approved details, ensuring proper attachment, maintaining 1/2 inch expansion joints and the installation of a minimum 2 inch bond breaker tape prior to sealing the joint.
7. Solidly weld Solar Bright Clad expansion joints with a 6 inch strip of Solar Bright membrane welded to the Solar Bright Clad, covering the bond breaker tape (cover plates are optional).

I. Roof Drains

1. Flash all roof drains in accordance with Solar Bright roof drain details.
2. Replace all worn or broken parts that may cut the Solar Bright membrane or prevent a watertight seal. This includes the clamping ring and strainer basket.
3. Replace all drain bolts or clamps used to hold the drain compression ring to the drain bowl.
4. Solar Bright non-reinforced 60 mil membrane shall be used for flashing the drain assembly. Drain assemblies and basins or "sumps" must be free of any asphalt or coal tar pitch residue prior to installation.
5. The drain target sheet should be sized and installed to provide for a minimum of 12 inch of exposed 60 mil on all sides of the drain..

19. FIELD QUALITY CONTROL

A. Perform field inspection and testing as required under provisions of Division 01 Section Quality Requirements & manufacturers recommendations.

B. Heat weld test cuts will be required. One (1) test cut per 5,000 square feet will be required.

C. Correct defects or irregularities discovered during field inspection.

D. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system a minimum of two (2) days per week. A copy of the specification should also be on site at all times.

20. CLEANING

A. Keep premises free from accumulation of waste and debris. At completion of installation remove surplus materials and debris.

B. At completion clean exposed surfaces in a manner that will not damage finish

21. FINAL INSPECTION

A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.

B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.

C. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor.

D. If core cuts verify the presence of damp or wet materials, the [Roofing] Contractor shall be required to replace the damaged areas at his own expense.

E. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements

F. Notify the Contractor, Architect, & Owner upon completion of corrections.

G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry.

B. Section 07 92 00, Joint Sealants.

C. Section 08 11 13, Hollow Metal Doors and Frames.

D. Section 09 91 23, Interior Painting.

E. Mechanical and Electrical Sections.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturer's regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Submit shop drawings of fabricated items showing profiles and relationship to adjacent materials.

C. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Provide 2 year guarantee for watertightness from date of filing of Notice of Completion.

Guarantee shall cover damage from leaks due to defective materials or workmanship.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. Except as herein modified, fabricate and install Work in accordance with printed standards of Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Architectural Sheet Metal Manual and Specifications, latest edition.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

1.09 PROJECT RECORD DOCUMENTS

A. Provide per Section 01 77 00, Project Close-out Procedures.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized iron sheet metal: Hot-dip galvanized copper-bearing steel. ASTM A525, 1.25 oz. psf Commercial Class; 24 ga. except where otherwise shown.

B. Lead: Fed. Spec. QQ-L-201, grade B. 4 lb/sf min.

C. Nails: Hot-dip galvanized annular thread, "stronghold" type.

D. Solder: ASTM B32, Class A1.

E. Flux: Muriatic acid.

F. Asphaltic primer: ASTM D41. Type as recommended by membrane roofing manufacturer

where sheet metal work is in contact with membrane roofing materials.

G. Plastic cement: Asphaltic, FS SS-C-153, Type I.

H. Flashing Reglets: Galvanized steel, 2-piece flashings, types as indicated on drawings.

I. Sealants: Non-hardening, non-sagging one part sealant per FS TT-S-230, Geocel 2000 or approved equal.

J. Sheet Metal Cladding: Manufacturer's recommended cladding for sheet metal at single ply roof.

K. Reglet: Terminator WaterTite Reglet as manufactured by O'Keeffe's Inc. Reglet shall be extruded high impact noryl, furnished with splice sleeves, U.V. stabilized EPDM wedge gaskets and Terminator Tape. WaterTite flashings shall be furnished in 22 gauge gsm.

1. Provide Type SS at plaster.

2. Provide Type CW at cast-in-place concrete.

3. Provide Type MI at masonry.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect and verify that installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. In event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 WORKMANSHIP, FABRICATION AND INSTALLATION

A. Specifications herein are minimum; provide such extra materials and workmanship as necessary to obtain required results. Install work in accord with recognized standards and best trade practices.

B. Where work is not otherwise shown or specified, conform to details and requirements set forth in the referenced SMACNA Manual.

C. Where materials or construction systems are specified with reference to a particular manufacturer (such as, reglets and caulking and sealants), make installations in strict accord with the approved manufacturer's installation instruction.

D. Except where otherwise noted or specified, sheet metal work shall be galvanized sheet metal. Make cleats and edge strips of the same metal as items with which they are used.

E. Accurately reproduce profiles and bends; make intersections sharp, even and true. Make plain surfaces free from buckles and waves with as few joints as possible. Reinforce work as required for strength and appearance.

F. Bend metals to minimum radius as recommended by manufacturer for thickness used (in general, the radius shall be not less than the thickness of metal) and in accordance with the referenced SMACNA Manual.

G. Provide for proper expansion and contraction caused by thermal or building movement. Make joints tight. Conceal nails and other fastenings where possible. **Face nailing through exposed surfaces is not permitted unless specifically shown.** Secure exposed edges to underlying materials with clips, cleats or tabs (edge strips). Provide neoprene washers at exposed fasteners.

H. Make seams in direction of flow.

I. Hem exposed edges of sheet metal work 1/2 inch.

J. Do cutting, fitting, punching, etc., in sheet metal to accommodate work specified elsewhere and provide necessary accessory items.

K. Properly apply caulking and sealants to sheet metal items to permit movement between surfaces and to make entire installation watertight. Conform to requirement of Caulking and Sealants Section.

L. Soldering: Roughen smooth surfaces with clean emery cloth or sandpaper; do not use steel wool. Use torch or well heated irons. Solder slowly, thoroughly heating seams and completely sweating solder through full width with a least 1" of solder evenly flowed along seams. Wherever possible, solder in a flat position. Solder seams on slopes greater than 45 degrees a second time. Solder immediately after application of flux; after soldering, immediately neutralize any corrosive flux with 5% soda solution and flush with clean water. Soldering of exposed surfaces shall be neatly done. Exposed solder shall be dressed and finished. Soldering shall be employed only to seal or fill seams. Where structural strength is required, do not rely on solder alone but use supplementary mechanical fasteners.

M. Cut edges or joints and abrasions which expose base metal of galvanized sheet metal shall be coated with solder to equivalent thickness of zinc coating before assembling or installing sheet metal items.

N. Priming Surfaces:

1. Coat all metal surfaces in contact with single ply roofing with primer or sealant as recommended by the roofing membrane manufacturer.

2. Coat all metal surfaces in contact with built-up roofing and Sealing Tape with asphalt primer, and allow to dry before setting in place.

O. Provide isolation of dissimilar metals from contact with each other by coating with asphalt primer.

P. Finish all sheet metal work straight and true, with miters and joints accurately fitted. Exposed

work shall be free of dents. All corners shall be reinforced, and seams soldered or otherwise made waterproof. Exposed edges shall be hemmed or finished smooth.

Q. All work shall be made watertight and leak proof. Except where provision is required for expansion and contraction, all joints and seams shall be locked, or otherwise made mechanically strong. Solder may be used, where appropriate, to make joints and seams watertight, but shall be considered as providing mechanical strength.

R. Fabricate sheet metal work from materials and of gauges indicated or specified. Where material is not indicated, fabricate from zinc coated steel sheet not less than 24 gauge.
   1. Cleats supporting bottom edges of sheet metal work shall be continuous; secure on not more than 24 inch centers. Provide cleats at free edges of flashing as indicated on Drawings.

S. Flashings:

   1. Install flashings required to provide watertight protection.

   2. Assemble and install flashings at roofing and waterproofing conditions to conform to approved manufacturer's recommendations and the requirements of the Built-up Roofing and Single Ply Roofing Sections.

   3. Carry flashings around corners 4 inch minimum; metal soldered or otherwise joined at the angle is not permitted. Three-way angles shall have the corners soldered watertight.

   4. Flashings installed to be fully restrained shall be nailed at 3" centers (max.); otherwise use clips or cleats.

   5. Roof flashings and related metal shall be installed with flanges on top ply of roofing and reinforced as per requirements of Roofing Sections.

   6. Unless metal manufacturer has more stringent requirements, make up continuous straight runs of flashings in 24 ft. maximum lengths. Unless otherwise shown or specified, connect continuous runs together with 3-inch loose lock expansion joints sealed watertight with sealants. Provide expansion joints at 10 ft. maximum from any external or internal corners, and in straight runs less than 24 ft. but more than 10 ft., make expansion joints at center of run. Running joints between expansion joints shall be locked and soldered or lapped and riveted/soldered. At joints, lap to be minimum 8".

   7. Flashings shall conform to the appropriate plates and recommendations of the referenced SMACNA Manual.

T. Metal Copings/Caps:

   1. Construct metal copings as shown on the Drawings and in conformance with referenced SMACNA Manual.

   2. Form to Details in 8'-0" lengths with bends formed so drip crimp on exposed (exterior) side will lock over bottom edge of continuous 18 gauge galvanized cleat for concealed

support. The back (roof) side shall be secure with a screw fastener with a neoprene washer through an oversized or slotted hole spaced at 24" o.c. maximum.

3. Except for expansion joints, solder joints in coping.

4. Provide expansion joints every 16'-0" using a 1-1/2" loose locked joint filled with sealant. Provide expansion joints at 8'-0" maximum from any internal or external corner per the referenced SMACNA Manual. Joints to be 8" minimum lap.

3.03 TOUCH-UP

A. Where galvanizing is damaged by fabrication or installation, repair surfaces with hot process galvanizing repair compound, "Galvalloy", "Galvweldalloy", or approved equal, applying in accord with manufacturer's printed directions. Float full, grind, and buff smooth.

3.04 CLEANING

A. Upon completion of installation, remove manufacturer's temporary labels, and marks of identification. Thoroughly wash surfaces and remove foreign material. Leave entire work in neat, orderly, clean and acceptable condition. Replace damage parts and surfaces which are not free from imperfections.

3.05 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

C. Exposed finishes shall be free from scratches, dents, permanent discolorations and other defects in workmanship or material.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 09 91 23, Interior Painting.

1.03 REFERENCE

A. ASTM C790 - Use of Latex Sealing Compounds.

B. ASTM C804 - Use of Solvent Release Type Sealants.

C. ASTM C834 - Latex Sealing Compounds.

D. ASTM C919 - Use of Sealants in Acoustical Applications.

E. ASTM C920 - Elastomeric Joint Sealants

F. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

G. ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).

H. SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.04 QUALITY ASSURANCE

A. Use only new materials and products.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. 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. Failure of installed sealers to comply with this requirements will be recognized as failures of materials and workmanship.

1.05 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for

use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: The following samples are required. Submit per Section 01 33 00.

1. Submit sample for each type of sealant to Architect for review.

2. Manufacturer's full range of colors for Architect's selection.

D. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.06 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Guarantee shall cover all materials and workmanship for a period of two (2) years from filing date of Notice of Completion.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Verify that job site conditions are within limits specified in product manufacturer's printed recommendations.

PART 2 - PRODUCTS

2.01 SEALANT AND MATERIAL MANUFACTURERS

A. Following is a list of acceptable manufacturers of sealants and sealant materials. Inclusion in this list is not intended to imply that all manufacturers make all products. Products made by listed manufacturers must comply with all specified requirements.
1. Bostik Construction Products.
2. Dow Corning Corporation.

3. General Electric Company.
4. W.R. Meadows, Inc.
5. Pecora Corporation.
6. Mameco International.
7. Tremco.

B. Substitutions: Under provisions of Section 01 33 00.

2.02 SEALANT TYPES

A. Single-Component Polysulfide (Non-Sag): ASTM C 920, Type S, Grade NS, Class 25, Use NT, G, A, M.

B. Multi-Component Polysulfide (Non-Sag): ASTM C 920, Type M, Grade NS, Class 25, Use NT, A, M.

C. Multi-Component Polysulfide (Self-Leveling): ASTM C 920, Type M, Grade P, Class 12.5 Use T, A, M.

D. Multi-Component Polysulfide (Water-Immersible): ASTM C 920, Type M, Grade NS, Class 12.5, Use NT, A, M.

E. Single-Component Urethane: ASTM C 920, Type S, Grade NS, Class 25, Use NT, A, M; USDA and FDA status.

F. Single-Component Urethane (Self-Leveling): ASTM C 920, Type S, Grade P, Class 25, Use T, A, M.

G. Multi-Component Urethane (Gun-Grade): ASTM C 920, Type M, Grade NS, Class 25, Use NT, A, M.

H. Multi-Component Urethane (Self-Leveling): ASTM C 920, Type M, Grade NS, Class 25, Use T, A, M.

I. Single-Component Silicone (Non-Acid Cure): ASTM C 920, Type S, Grade NS, Class 25, Use NT, G, A, M; USDA and FDA status.

J. Single-Component Silicone (Acid Cure): ASTM C 920, Type S, Grade NS, Class 25, Use NT, G, A, M; USDA and FDA status.

K. Acrylic-Latex Caulk: ASTM C 834.

L. Butyl Rubber: Federal Specification TT-S-001657.

M. Bedding Compound: For installation of thresholds and similar items indicated to be bedded in sealant, use a preformed butyl-polyisobutylene sealant tape. Size of tape as required for the specific application.

2.03 JOINT AND SURFACE TYPES

A. Pedestrian and Vehicle Traffic Joints - Provide one of the following for each joint type:
   1. Multi-component polysulfide (self-leveling)
   2. Multi-component urethane (self-leveling)
   3. Single-component urethane (self-leveling)

B. Non-Traffic Deck Joints - Provide one of the following for each joint type:
   1. Multi-component urethane (gun-grade)
   2. Single-component urethane

C. Vertical Joints - Provide one of the following for each joint type:
   1. Single-component polysulfide (non-sag)
   2. Multi-component polysulfide (non-sag)
   3. Multi-component urethane (gun-grade)

D. Expansion, Control, and Perimeter Joints - Provide one of the following for each joint type:
   1. Multi-component urethane (self-leveling)
   2. Single-component urethane; use only where dynamic movement will not exceed 50 percent of joint width - above or below grade
   3. Single-component urethane (self-leveling)

E. Curtainwalls and Related Assemblies - Provide one of the following for each joint type:
   1. Single-component silicone (neutral cure)
   2. Single-component silicone (acid cure)

F. Non-Moving Joints, Interior and Exterior: Butyl rubber.

G. Water-Immersion Areas - Provide one of the following for each joint type:
   1. Multi-component polysulfide (self-leveling)
   2. Multi-component polysulfide (non-sag)

H. Glazing - Provide one of the following for each joint type:
   1. Single-component silicone (neutral cure)
   2. Single-component silicone (acid cure)

I. Wood Window Glazing - Acrylic-latex calk.

J. Acoustical Sealant - Provide one of the following for each joint type:
   1. Acrylic-latex caulk
   2. Butyl rubber

K. Kitchen Areas: Sealant complying with FDA requirements for use in food areas - Provide one of the following for each joint type:
   1. Single-component urethane
   2. Single-component silicone (neutral cure cure)

3. Single-component silicone (acid cure)

L. Toilet and Bath Areas: Sealant containing a fungicide for mildew resistance - Provide one of the following for each joint type:
   1. Single-component silicone (neutral cure)
   2. Single-component silicone (acid cure)

M. Exterior Doors and Windows: Sealant used for exterior joints or butyl rubber.

N. Interior Doors and Windows - Provide one of the following for each joint type:
   1. Acrylic-latex caulk
   2. Butyl rubber

O. Built-In Cabinet Work: In kitchen, toilet, and bath areas, as specified for those areas. In other areas, single-component silicone (acid or non-acid cure) or acrylic-latex caulk.

P. Rated Walls: Fire-rated Sealant, UL Systems in accordance with Section 07840.

2.04 SEALANT COLORS

A. Provide materials matching colors indicated or if no color as indicated, matching the color samples selected from those submitted to the Architect.

2.05 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round, closed cell polyethylene or butyl rubber backer rod; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive Work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions.

D. Protect elements surrounding the Work of this Section from damage or disfiguration.

3.03 INSTALLATION

A. Do not proceed with sealant Work until the sample joints specified in Part 1 of this Section have been prepared and accepted by the Architect.

B. Install sealant in accordance with manufacturer's instructions.

C. Measure joint dimensions and size materials to achieve required 2:1 width/depth ratios.

D. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave unless detailed otherwise.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01500.

B. Protect sealants until cured.

END OF SECTION

HOLLOW METAL
DOORS & FRAMES

Section 08 11 13
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 20 00, Finish Carpentry

B. Section 07 92 00, Joint Sealants

C. Section 08 71 00, Door Hardware

D. Section 09 24 00, Cement Plaster.

E. Section 09 29 00, Gypsum Board.

F. Section 09 91 23, Interior Painting

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Manufacture all labeled doors and frames in strict conformance with the specifications and procedures of Underwriters Laboratories Inc. (UL).

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Shop Drawings: Show all parts, connections and anchorages, adjacent materials, fully dimensioned and noted.

D. Executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Guarantee doors and frames from defects in materials and workmanship including twisting, buckling or warping for a period of 2 years from filing of Notice of Completion.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. ANSI - American National Standards Institute

C. ANSI/NFPA 80 - Standard for Fire Doors and Windows.

D. ANSI/DHI A 115.IG - Installation Guide for Doors and Hardware.

E. ANSI/BHMA A 156 - Specifications for Hardware Preparations in Standard Steel Doors and Frames.

F. ANSI/SDI A 250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames.

G. SDI - Steel Door Institute

H. SDI-111 - Recommended Standard Details for Steel Doors & Frames.

1.07 FIRE RESISTIVE LABELS

A. Labeled Doors: Conform with UL requirements; doors shall bear label for fire resistive rating indicated.

B. Labeled Frames: Construct frames for labeled openings per UL requirements and their listings. Provide UL label for fire resistive rating indicated.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off the ground and in areas so as to not interfere with the progress of the work. Doors with dents or other defects not repairable will be rejected.

C. Transport, store and handle in strict conformance with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

E. Store frames in upright position.

1.09 PROJECT CONDITIONS

A. Verify that conditions are correct and proper for installation of products. Obtain accurate job dimensions of openings including floor elevations. Ascertain correct locations and arrangements of anchorage required to accommodate work.

PART 2 - PRODUCTS

2.01 HOLLOW METAL DOORS

A. General: Shop fabricate to required sizes and shapes. Form and weld with straight arises, edges and corners; surfaces free from warp, wave, buckle, dents or other defects. Use of excessive metallic filler to conceal manufacturing defects is not acceptable. Construct per Steel Door Institute (SDI) "Recommended Specifications, Standard Steel Doors and Frames", (latest edition), plus additional specified requirements.

B. Fabrication: Flush Doors; Type II, heavy duty, 1-3/4 inches thick, 18 ga. steel face sheets over stiffeners; faces free of seams or joints. Close top and bottom edges by welding flush or with recessed 18 ga. spot welded channels. Weatherproof top edge of exterior doors. Turn face sheets over vertical edges of doors and mechanically interlock, spot weld at approximately 2" on center.

C. Reinforcement: Stiffen as recommended by SDI or using any method conforming with ANSI A 151.1 criteria for determining twist test strength.

D. Insulation: Door manufacturer's standard sound deadening material on door interior. Sound deadening material in labeled doors shall conform to UL requirements.

E. Cutout: Make cutouts for required louvers and glazing; provide steel non-removable stops on outside face and removable stops on interior face.

F. Preparation for Hardware: Factory prepare and reinforce doors for indicated finish hardware. Make cutouts and mortises for mortise hardware.

1. Provide 10 ga. flat steel reinforcement for hinges; 12 ga. for locksets and surface applied hardware. All gages minimum.

2. Internal reinforcing shall prevent collapse of face sheets by stress of lockset installation. Provide reinforcement on both faces of all doors for surface mounted closers, whether or not closers are indicated.

3. Perform drilling and tapping for mortise hardware at factory to templates furnished by hardware vendor. Drilling and tapping for surface applied hardware by hardware installer.

G. Louvers (Fixed): Manufacturer's standard fixed slat, 20 ga. cold-rolled steel. Factory cleaned, bonderized and prime coated.

H. Metal Insulated Panels: .062" smooth aluminum faces on both sides of plywood core, prefinished with corrosion resistant primer and custom color paint finish, 1" total thickness.

I. Glass Stop: Unit frame, model FGS 75, manufactured by Anemostat Products Division, Carson, CA, or an approved equal, for fire rated and non-fire rated doors.

1. Frame: 18 gauge.
2. Finish: Factory primed; field painted under Section 09 91 10.
3. Unit shall shall have UL or WH label and State Fire Marshal approval number.
4. Glazing: As specified in Section 08 80 00.
5. Mounting: Countersink, one-way vandal-resistant head, through-bolts.
6. Exterior Doors: Unit shall be hot-dip galvanized after fabrication.

2.02 PRESSED METAL FRAMES

A. General: Welded type per CS242 as minimum requirements, plus additional requirements specified herein. Shop fabricate with straight arises, edges and corners; surface free from warp, wave, buckle, dents or other defects. Use of excessive metallic filler to conceal manufacturing defects is not acceptable.

B. Fabrication: Manufacturer's standard, modified where shown, 16 ga. steel, cross section profile as shown, depth to suit wall thickness. Header and jambs secured at corners by internal welding of faces or by welded splice plates, and further secured at webs by welding or mechanical interlock; exposed joints neat and tight. Provide temporary metal spreaders at bottom of frames to maintain rigidity. Welding per applicable standards of AWS for high grade hollow metal work.

C. Anchors: Provide at 2' -0" max. spacing, min. 16 ga. x 2" wide to securely fasten frames to wall construction involved (wire anchors not acceptable); anchor bottom of frame within 2 inches of floor to wood framing or concrete curb (where occurs) with expansion anchors, both sides. Provide minimum 2 anchors at head of frames over 2' - 6" wide, and minimum 4 anchors per door jamb. Anchors shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping. Position one jamb anchor above top butt reinforcement and one jamb anchor below bottom butt reinforcement. Anchors for labeled frames shall conform to UL requirements.

1. Anchor types:

a. New wall (wood framing): Wood stud anchors; 16 ga., 2" wide steel anchor straps, securely welded inside each jamb at interior side(s). **Continuous steel nailing flange at exterior side.**

b. New wall (masonry/concrete): Strap & Stirrup anchors, 16 ga., 2" x 10", corrugated and perforated, spot welded to back of jamb soffit.

c. Existing wall (wood framing): Existing opening anchor; pipe spacer with 16 ga., 2" wide steel reinforcing strap, welded inside each jamb, at outside edge. Use FHMS with minimum 2" penetration into solid framing.

d. Existing wall (masonry/concrete framing): Existing opening anchor, same as for wood framing noted above, into expansion anchors set securely in existing walls.

e. Other areas: As required for secure, installation as recommended by the HMMA - Hollow Metal Manual and the Manufacturer.

2. All anchors to be UL approved for use on labeled frames.

D. Preparation for Hardware: Factory prepare and reinforce door frames for approved finish hardware. Make cutouts and mortises for mortise hardware. Provide 10 ga. steel reinforcement for hinges, 12 ga. for lock strikes and closers, and 14 ga. for surface applied hardware.

1. Provide reinforcement at head of frames for surface mounted closers at all doors whether or not closers are indicated.

2. Punch lock jamb of frames; install 4 rubber door silencers. For pairs of doors, locate door silencers at head, two for each door.

3. Provide steel housing closures for hardware mortise to prevent intrusion of plaster, mortar or concrete.

4. Perform drilling and tapping for mortise hardware at factory to templates furnished by hardware vendor. Drilling and tapping for surface applied hardware will be done by hardware installer.

E. Sound deadening for door frames in hollow wall (wood frame) construction: Coat all inside (concealed) faces with fibered asphalt emulsion similar to autobody undercoating. Apply over shop primer 1/8 inch thick and thoroughly dry before handling.

F. Special Frames: 16 ga. with integral stop formed to cross section profile indicated. Provide muntins, mullions, and impose sections required, removable glazing stops or molding secured with tamper-proof oval head self-tapping screws set in countersunk holes at 12 inches o.c. Weld corners of frame, grind smooth on exposed frames. Structure shall be adequate to withstand 25 lbs/sf wind load normal to glass surface.

2.03 PRIMING

A. Bonderize and factory paint doors and frames with one coat of baked-on rust inhibitive primer. Back coat frames with asphaltic emulsion wherever frames will be in contact with masonry. **Verify and coordinate primer compatibility with finish painting**. Prior to and after primer is applied, store and protect doors properly to prevent the possibility of rusting or moisture damage. Doors and frames shall be re-primed on-site prior to finish painting.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. Prior to fabrication, verify every opening size, including wall thickness, and coordinate with

door sizes as shown on drawings.

D. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 INSTALLATION

A. General: Install metal doors and frames and accessories in conformance with reviewed Shop Drawings and manufacturer's data, and as specified herein.

B. Placing frames:

1. Comply with provisions of SDI-105 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.

2. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

   a. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels. Coordinate building-in of anchors and grouting of frames with other trades.

3. Anchor to floor slab with power type actuated fasteners through floor anchors attached to frames.

4. Anchor securely to metal studs with four (4) No. 12 sheet metal screws per anchor.

5. Anchor continuous nailing flange securely to wood studs with four (4) No. 12 x 2" flat head wood screws per anchor. Attach anchor straps at interior side and all interior straps with four (4) 10d ring shank nails per anchor.

6. Seal perimeter of frames where shown or required to fill space between frame and adjoining material. Sealant materials and application shall conform to applicable requirements of Section 07 92 00. Where sealant is entirely concealed and wall components forming door openings are not designed for differential movement, oil based caulking compound may be used; otherwise, use one part synthetic rubber sealant.

7. When installing new frames in existing openings, remove existing finishes sufficiently to properly install and adequately fasten new frame. Prepare openings as required to receive new frame. Cut back existing finishes as necessary. Provide misc. blocking, backing, straps, etc. to fully prepare opening for new frame. Patch and repair surfaces when completed to match adjacent finishes.

C. Doors: Hang with clearances noted in Section 08 71 00, Finish Hardware, unless otherwise indicated or required for rated assemblies. Apply hardware in conformance with SDI-100 and the manufacturer's written instructions.

D. Except for frames installed in metal or wood stud walls, grout all other frames solid. When temperature conditions necessitate an additive be used in grout to prevent freezing as frames are installed, installer of frames shall coat inside of frames with corrosion inhibiting

bituminous material.

E. Coordinate installation of hardware including installation of intrusion detection system components and wiring.

F. Intrusion Coordination: Relocate wiring and provide new, compatible sensors in new doors as required for a fully operational system.

3.03 ADJUST AND CLEAN

A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Immediately prior to punch list walk-through, check and re-adjust operating finish hardware items, leaving metal doors and frames undamaged and in complete operating condition.

3.04 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry.

B. Section 08 71 00, Finish Hardware, for Cylinders.

C. Section 09 24 00, Cement Plaster.

D. Section 09 20 00, Gypsum Wallboard.

F. Section 09 91 13, Exterior Painting.

G. Section 09 91 23, Interior Painting

G. Division 23, Mechanical Work, for mechanical equipment requiring access.

H. Division 26, Electrical Work, for electrical equipment requiring access.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. For installation of special doors use only personnel thoroughly trained and experienced in installation of the selected projects, and familiar with the requirements of this project.

E. All special door assemblies requiring fire resistance ratings shall bear UL labels for class required. Labels shall be attached to door and frames.

1.04 SUBMITTALS

A. Refer to Section 01 30 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Shop Drawings: Show all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Show locations of all doors and panels on plan.

D. Executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 30 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Guarantee doors shall operate properly and will be free of defects in material and workmanship for a period of two years from date of filing of Notice of Completion.

1.06 REFERENCES AND STANDARDS

A. Tilte 24, Part 2, CCR, California Building Code.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

PART 2 - PRODUCTS

2.01 ACCESS DOORS

A. Wall Doors (fire rated): Milcor Fire Rated Doors for Walls:

1. Material: Prime painted steel: 16 gauge frame with 20 gauge door panel.

2. Finish: Chemically bonded with prime coat of baked-on electro-static powder.

3. Hinge: Continuous type; steel with stainless steel pin.

4. Automatic panel closer: Typical.

5. Lock: Self-latching with flush, key-operated cylinder lock with two keys with interior latch release.

6. Anchors: Furnish with anchors as required.

B. Masonry and Tile Wall Doors: Milcor Style M Standard Flush Door (non-rated):

1. Material: 14-gauge steel frame and door panel.

2. Finishes: Chemically bonded with a prime coat of baked-on electro-static powder.

3. Hinge: Concealed spring hinges open to 175 degrees. Extracting pin from hinge leaf attached to panel permits panel removal. Number of hinges varies with size of door.

4. Lock: Cylinder lock with two keys.

5. Anchors: Furnish with anchors as required.

C. Ceiling Doors: Milcor Fire-Rated Doors for Drywall Ceilings (one-hour):

1. Material: Cold-rolled steel: 16-gauge frame with 18-gauge door panel; 20-gauge panel sides and 26-gauge panel hat channel.

2. Finishes: Chemically bonded with a prime coat of baked-on electro-static powder. The exposed edges have a prime coat of white, rust-inhibitive paint. Ceramic fiberboard facing on covers.

3. Hinge: Continuous "piano-type"; one per door.

4. Lock: Self-latching spring bolt lock, with key-operated cylinder lock mounted flush with the ceiling finish.

D. Aluminum Ceiling Access Doors: Style CT (suspended acoustical ceilings)

1. Material: 1/4" extruded aluminum and 1/8" aluminum plate.

2. Finish: Aluminum.

3. Hinge: Stainless steel.

4. Construction: Frames are 1/4" aluminum extrusions assembled with mitered and welded corners. Hanger brackets with pre-drilled 7/16" holes are welded near each corner on the hinge side and opposite side. Covers are 1/8" aluminum plate mounted to the frame with a continuous hinge. Aluminum edging on tile covers provides a 3/4" recess for tile.

E. Ceiling Doors: Milcor style DW (drywall ceilings.

1. Material: 16 gauge steel frame with 16 gauge door panel.

2. Finish: Chemically bonded with a prime coat of baked-on electro-static powder. The exposed edges have a prime coat of white, rust-inhibitive paint. Ceramic fiberboard facing on covers.

3. Hinge: Concealed spring hinges open to 175 degrees. Extracting pin from hinge leaf attached to panel permits panel removal. Number of hinges varies with size of door.

4. Lock: Cylinder lock with two keys.

5. Anchors: Furnish with anchors as requires.

F. Plaster Walls, Ceilings and Soffits (non-rated) Milcor Style K, flush frame access door, typical all non-rated locations:

1. Material: 16 gauge steel frame with 14 gauge door panel and 22 gauge galvanized casing beads.

2. Finish: Chemically bonded with a prime coat of baked-on electrostatic powder.

3. Hinge: Concealed spring hinges to open 175 degrees.

4. Lock: Cylinder lock with two keys.

G. Drywall Walls and Ceilings (non-rated) Milcor Style DW, flush frame access door, typical all non-rated locations.

1. Material: 16 gauge steel frame with 14 gauge door panel. Galvanized steel drywall bead.

2. Finish: Chemically bonded with a prime coat of baked-on electrostatic powder.

3. Hinge: Special, double-acting concealed spring hinges opening to 175 degrees.

4. Lock: Cylinder lock with two keys.

H. Keying: All doors shall be keyed alike. Provide minimum 2 keys for each door at end of project to District.

I. Size: Provide minimum 22" x 30" doors or larger if a larger opening is required for maintaining or replacing an item.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install access doors in accord with door manufacturer's printed instructions. Completed installation shall operate smoothly.

B. Provide access doors at locations shown on drawings, as noted **and as required to access all equipment requiring maintenance, replacement or inspection including but not limited to smoke/heat detectors, fire dampers, clean-outs, valves, etc.** See Mechanical and Electrical plans for equipment locations.

C. Coordinate location with structure, fixtures and equipment. Provide layout for approval prior to framing openings.

D. Provide doors in walls/ceiling appropriate to type of assembly.

E. Field paint doors per section 09900.

F. Coordinate keypad access panel with intrusion alarm installer for installation of conduit and equipment.

3.02 PROTECTION

A. Protect work and materials of this Section prior to and during installation and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

3.03 CLEANING AND REPAIRING

A. Touch up damaged areas in shop primed surfaces which will be concealed after erection. Leave in condition fit for finish painting by other trades. Repair or replace defective materials as directed. Lubricate hardware and leave entire installation clean and in good operating condition.

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. 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. CBC - California Building Code.
2. CEC - California Electrical Code.
3. NFPA 80 - Fire Doors and Windows.
4. NFPA 101 - Life Safety Code.
5. NFPA 105 - Installation of Smoke Door Assemblies.
6. 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. 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.

D. 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.

E. 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. 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.

F. California Building Code: Provide hardware that complies with CBC Section 11B.

1. All openings as a part of an accessible route shall comply with CBC Section 11B-404.

2. The clear opening width for a door shall be 32” minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There shall be no projections into it below 34” and 4” maximum projections into it between 34” and 80” above the finish floor or ground. Door closers and stops shall be permitted to be 78” minimum above the finish floor or ground. CBC Section 11B-404.2.3.

3. Operable hardware on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Operable parts of such hardware shall be 34” minimum and 44” maximum above finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.

4. Hardware (including panic hardware) shall not be provided with “nightlatch” function for any accessible doors or gates unless the following conditions are met:

a. Such hardware has a ‘dogging’ feature and is dogged during the time the facility is open.

b. All ‘dogging’ operation is performed only by employees as their job function (non-public use).

5. The force for pushing or pulling open a door shall be in accordance with CBC Section 11B-404.2.9.

   a. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 pounds (22.2 N) maximum. Required fire doors: the minimum opening force allowable by the DSA authority, not to exceed 15 pounds (66.7N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.
   b. The force required for activating any operable parts, such as lever hardware, or disengaging other devices shall be 5 pounds (22.2N) maximum to comply with CBC Section 11B-309.4.
   c. The 5 pound (22.2 N) maximum force shall be validated for the size of the door used. The Building Materials Listing of the California State Fire Marshal shall indicate that the door hardware meets the 5 pound (22.2 N) force and shall also list the largest door that can be used.

6. Door closing speed shall comply with CBC Section 11B-404.2.8. Closers shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.

7. Floor stops shall not be located in the path of travel and 4” maximum from walls.

8. Thresholds shall comply with CBC Section 11B-404.2.5.

G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware

(including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied 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 mortise locks and latches.
2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
3. Ten 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 certified 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).
    b. McKinney (MK).
    c. Stanley Hardware (ST).

2.3 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls 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 (10) 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. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Where specified, provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.

2. Manufacturers:

    a. Sargent Manufacturing (SA) - 8200 Series.
    b. No Substitution.

B. Tubular Locksets, Grade 1 (Extra Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.

1. Locksets to withstand 3000 inch pounds of torque applied to the locked lever without gaining access.

2. Locksets to fit a standard 2 1/8” bore without the use of through-bolts.

3. Lever handles to be made of solid material with no plastic fillers.

4. Latchbolt head to be one-piece stainless steel construction encased within the lock body.

5. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA A156.2 requirements to 34 million cycles.

6. Furnish with standard 2 3/4” backset and 1/2" throw latchbolt (3/4" at rated paired openings).

7. Manufacturers:

    a. Sargent Manufacturing (SA) - 11 Line.
    b. No Substitution.

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. Sargent Manufacturing (SA) - 4870 Series.
    b. No Substitution.

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 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring

power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

    a. Corbin Russwin Hardware (RU) - DC6000 Series.
    b. Norton Rixson (NO) - 7500 Series.
    c. Sargent Manufacturing (SA) - 351 Series.

C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, high efficiency 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 of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.

1. Manufacturers:

    a. Corbin Russwin (RU) - DC5000 Series.
    b. Norton Rixson (NO) - 2800ST Series.
    c. Sargent Manufacturing (SA) - 422 Series.

2.9 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

   a. Hiawatha, Inc. (HI).
   b. Rockwood (RO).
   c. Trimco (TC).

2.10 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified 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. Rockwood (RO).
   c. Trimco (TC).

2.11 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and 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).

2.12 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.

2.13 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. 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. SA - SARGENT
3. RO - Rockwood
4. NO - Norton
5. PE - Pemko
6. OT - Other

Hardware Sets

Set: 1.0

Doors: D120, F119

3	Hinge (heavy weight)	T4A3386 NRP	US32D	MK
1	Storeroom Lock	11G04 OL	US26D	SA
1	Door Closer	PR7500	689	NO
1	Kickplate	K1050 10" High x CSK	US32D	RO
1	Door Stop	471 EXP	US26D	RO
1	Threshold	Per Detail & Field Conditions x FHSL14		PE
1	Gasketing	294AV		PE
1	Sweep	315CN		PE

Set: 2.0

Doors: D125, D126

3	Hinge (heavy weight)	T4A3386	US32D	MK
1	Keyed Privacy	V21 8225 LNL	US26D	SA
1	Surface Closer	2800ST	689	NO
1	Kickplate	K1050 10" High x CSK	US32D	RO
1	Mop Plate	K1050 6" High CSK	US32D	RO
1	Wall Stop	409	US32D	RO
1	Threshold	Per Detail & Field Conditions x FHSL14		PE
1	Gasketing	294AV		PE
1	Sweep	18100CNB		PE

Set: 3.0

Doors: D119, D122, F118, F120

3	Hinge (heavy weight)	T4A3386 NRP	US32D	MK
1	Classroom Deadlock	4877	US26D	SA
1	Push Plate	71E (drill for thumbturn)	US32D	RO
1	Pull Plate	110x70C (drill for cylinder, pull offset low)	US32D	RO
1	Door Closer	PR7500	689	NO

1	Kickplate	K1050 10" High x CSK	US32D	RO
1	Door Stop	471 EXP	US26D	RO
1	Threshold	Per Detail & Field Conditions x FHSL14		PE
1	Gasketing	294AV		PE
1	Sweep	315CN		PE

Set: 4.0

Doors: E104.1, E105.1

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Classroom Security Lock	11G38 OL	US26D	SA
1	Door Closer	PR7500	689	NO
1	Kickplate	K1050 10" High x CSK	US32D	RO
1	Wall Stop	409	US32D	RO
1	Gasket	S44D Head & Jambs		PE

Set: 5.0

Doors: C101, C102, C103, C104, C105, C106, D101, D102, D103, D104, D105, D106, D107, D108, D109, D111, D112, D113, D114, D115, D116, D117, D118, D123, D124, E101, E102, E103, E104, E105, E106, F101.1, F102, F107, F107.1, F108, F109, F110, F113, F114, F121

1	Threshold	Per Detail & Field Conditions x FHSL14		PE
1	Sweep	315CN		PE
1	Balance of Hardware	Existing to Remain		OT

Set: 6.0

Doors: D110, D111.1, D112.1, D117.1, D118.1, D121, E101.1, E102.1, E104.1, E106.1, F101, F102.1, F103, F103.1, F105, F106, F108.1, F109.1, F113.1, F114.1, F115, F116

1	Existing Hardware	To Remain		OT

Set: 7.0

Doors: A119

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Classroom Lock	11G37 OL	US26D	SA
1	Door Closer	PR7500	689	NO
1	Kickplate	K1050 10" High x CSK	US32D	RO
1	Wall Stop	409	US32D	RO
3	Silencer	608		RO

END OF SECTION 087100

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 08 11 13, Hollow Metal Doors and Frames.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

1.04 SUBMITTALS

A. Refer to Section 01 30 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: The following samples are required. Submit per Section 01 30 00.

1. Submit sample for each type of glass with identifying label to Architect for review.

D. Shop Drawings: Show all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Identify all locations of tempered and safety glazing.

E. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 30 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Guarantee shall be for two years after filing Notice of Completion, during which period installation shall operate freely and be weather-tight.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, 2019 California Building Code.

B. ASTM 1036, Standard Specification for Flat Glass.

C. "Glazing Manual" and "Glazing Sealing Systems Manual" of Flat Glass Marketing Association and printed recommendation of the manufacturer of materials being used, except as hereinafter modified.

D. Safety Standard for Architectural Glazing Materials (16 CFR 1201) of the Consumer Product Safety Commission, as amended to date.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Do not perform work under adverse weather or job conditions. Install liquid sealants when temperatures are within lower or middle third of temperature range recommended by manufacturer.

B. Do not apply any compound or sealant at temperature lower than 40 degrees F or on a damp, dirty or dusty surface.

1.09 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: All glass shall conform to ASTM 1036, Standard Specification for Flat Glass and shall be of domestic manufacture. Thickness shall be as specified herein and as required by Chapter 24, CBC for size of opening. Provide fabricator labels, showing strength, type and thickness of glass. Labels must remain on glass until it has been set, inspected and approved.

B. Clear Float Glass: Quality Q-3 - Glazing Select glass, 1/4" thick or heavier where required, ASTM C1036-91 Standard Specification for Flat Glass, by LOF or approved equal. Tempered where required. For thickness requirements, refer to ASTM E 1300.

C. Grey Tinted Float Glass: Quality Q-3 - Glazing Select glass, 1/4" thick or heavier where required, LOF "Grey Tint" with light transmission of 46%, ASTM C1036-91 or approved equal. Tempered where required. For thickness requirements, refer to ASTM E 1300.

D. Insulated Glazing: 1" double glazing; exterior light 1/4" thick grey, blue-green tint or other float glass; interior light 1/4" clear float glass. Use at all exterior lights except where otherwise noted. Provide tempered lights where required.

E. Tempered Float Glass: ASTM C1048-92. Fully horizontal tempered (after cutting to final size) to achieve a flexural strength 4 times normal glass strength. All tempered glass is to have permanent logo signifying compliance with the Consumer Product Safety Commission 16 CFR 1201 C1 and C11.

F. Wire Glass: Glass shall be new, clear, polished, with welded wire mesh, Libby Owens Ford "Polished Wired", or approved equal. Thickness of wire glass shall be 1/4 inch. All wire glass shall be Underwriters' Laboratories approved. Use tempered wire glass at all openings in 1-hour corridors and where scheduled or otherwise indicated in the documents.

G. Mirror Glass: ASTM C1036 Type 1, transparent flat, Class I clear, quality Q-1 mirror select; 1/4" thickness.

H. Glass Shelves: 1/4" thick glazing quality, tempered clear float glass with all edges rounded, satin pencil polish edge. Refer to LOF-ATS 115, Permissible load for glass shelves.

I. Display Case Glass: 1/4" thick clear float glass with ground edges and finger pulls.

J. Spandrel Glass: Heat strengthened insulated glazing with opaque ceramic frits (inside surface of inboard glass).

2.02 GLAZING ACCESSORIES

A. Setting Blocks: Blocks shall be semi-hard neoprene or vinyl rubber of the sizes recommended by glass manufacturer. Refer to LOF-ATS 103, Glass Blocking Guidelines.

B. Glazing Compound: For glazing in metal surrounds, DAP 1231 "Flexiglaze" glazing compounds, Pecora M-251 Channel Glazing Compound, or approved equal, in manufacturer's standard colors as selected by the Architect.

C. Glazing Sealants: Acrylic Terpolymer; Tremco "Mono" or equal.

D. Glazing Tapes: Polyisobutylene or Macro-Polyisobutylene preformed glazing tape; Tremco 440, Presim 440 or Polyshim tape. Glazing systems shall combine a pre-extruded tape plus a liquid sealant. Glazing systems for each sash condition shall be in accordance with manufacturer's recommendations.

E. Filler Rod: Compressible synthetic rubber or foam; chemically compatible with sealant used.

F. Primer-Sealers and Cleaners: As recommended by sealant manufacturer.

G. Mirror Glazing:

a. Glazing Channel: J-Ben Model No. A718VT, manufactured by Hoskin and Muir, or

approved equal.

b. Mirror Adhesive: Super Set Micro-Mastic, manufactured by Palmer, or approved equal.

c. Mirror Clips: 1/4" CRL lucite, manufactured by the C.R. Lawrence Company, Inc., or approved equal, with oval head screws in lengths as required.

2.03 FABRICATION

A. Cut glazing with smooth, straight edges to full size required by openings and to obtain bearing along entire width of pane.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect all sash, frames and surrounds to be glazed, and notify Contractor of any defects, improper materials or workmanship or other conditions which will affect satisfactory installation of glass. Do not proceed with glazing until such conditions have been corrected. Absence of notification, or beginning of glazing, shall constitute acceptance of all previously placed related work executed by other trades; later claims of defects in such work will not relieve glazier from responsibility to produce satisfactory work. Following work will be executed by other trades, but before starting glazing work, verify compliance with stated requirements:

1. That sash and frames are firmly anchored in proper position, plumb and square within 1/8 inch of nominal dimensions on Drawings and approved Shop Drawings.

2. That all rivet, screws, bolts or nail heads, welding fillets and other projections are removed from glazing rabbets to provide required clearances.

3. That all corners and fabrication intersections are sealed and sash and frames are weather-tight.

3.02 PREPARATION

A. Sizes of glass indicated on Drawings are approximate only; determine actual sizes required by measuring frames to receive glass at Project Site. Dimensions for glass and glass holding surrounds shall be coordinated to provide required minimum clearances.

B. Preparation of Glass and Rabbets: Clean sealing surfaces, including removal of protective coating from aluminum, at perimeter of glass and sealing surfaces of rabbets of stop beads before applying any glazing sealant or tape. Use only approved solvents and cleaning agents recommended by the compound manufacturer.

3.03 INSTALLATION OF GLASS

A. Glazing Fixed Glass Frames with Removable Stops:

1. Center glass in glazing rabbet to maintain required Clearances at perimeter on all four sides. Maintain centered position of glass in rabbet and provide glazing tape of

required thickness (1/16 inch minimum) on both sides of glass. Whenever glass dimensions exceed 50 united inches, provide setting blocks at sill and spacer shims on all four sides; locate setting blocks 1/4 way in from each end of glass.

2. Apply butyl tape, full width of stop face to each face of stops with evenly applied pressure, and allow it to overlap sight line. Place setting blocks and spacer shims as required. Press glass into position and secure in place by application of removable stops. Secure metal stops with self-tapping oval head machine screws. Dimple frames to countersink screw heads.

3. Trim excess tape flush on both sides of glass to provide clean sight line. Apply sealant to result in assembly that is completely air and water tight and neat in appearance.

B. Provide safety glazing at all hazardous locations required per CBC 2406.

3.04 ADJUSTING AND CLEANING

A. Upon completing of glazing, thoroughly clean all glass surfaces, correct all imperfections, replace all damaged glass, and leave all labels on the glass until they have been inspected and approved by the Architect but remove all labels immediately thereafter.

3.05 CURE, PROTECTION AND CLEANING

A. Cure glazing sealants and compounds per manufacturer's instructions and recommendations.

B. Protect exterior glass from breakage immediately upon installation by attachment of crossed streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass.

C. Protect finished surfaces from scratches, abrasions and other damage; marred or damaged work will be rejected.

D. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during the construction period at no additional cost to the Owner.

E. Maintain glass in a reasonably clean condition during construction, so that it will not be damaged by corrosive action and materials which might contribute (by wash-off) to the deterioration of glazing materials and other work.

F. Leave all labels on the glass until they have been inspected and approved by the Architect, but remove all labels immediately thereafter.

G. Wash and polish glass on both faces not more than 4 days prior to Owner's acceptance of the work in each area. Comply with glass manufacturer's recommendations.

END OF SECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Metal furring and lathing.

B. Portland cement plaster system.

1.02 RELATED SECTIONS

A. Section 09 91 10, Painting

B. Section 04 21 50, Adhered Thin Brick Units

1.03 REFERENCES

A. ASTM C150 - Portland Cement.

B. ASTM C206 - Finishing Hydrated Lime.

C. ASTM C847 Specification for Metal Lath

D. ASTM C897 - Aggregate for Job-Mixed Portland Cement - Based Plasters.

E. ASTM C926 – Application of Portland Cement-Based Plaster.

F. ASTM C932 - Bonding Compounds for Exterior Plastering.

G. Chapter 25, California Building Code.

1.04 SUBMITTALS

A. Provide product data on plaster materials, characteristics and limitations of products specified.

1.05 QUALITY ASSURANCE

A. Applicator: Company specializing in cement plaster work with five years experience.

B. Apply cement plaster in accordance with California Building Code.

C. Mockups: Prior to installing plaster work, construct panels for each type of finish and application required to verify selections and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with following requirements, using materials indicated for final unit of Work.
   1. Locate mockups on-site in location and of size indicated or, if not indicated, as directed by Architect.
   2. Erect mockups 48 by 48 inches by full thickness in presence of Architect

using materials, including lath, support system, and control joints, indicated for final Work.

3. Notify Architect 7 days in advance of dates and times when mockups will be constructed.
4. Demonstrate proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before start of plaster Work.
6. Retain and maintain mockups during construction in an undisturbed condition as standard for judging completed portland cement plaster Work.
   a. When directed, remove mockups from Project site.

1.06 DELIVERY AND STORAGE

A. Deliver products to site in unbroken containers or in bundles marked by manufacturer's name.

B. Store products in dry location.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not apply plaster when substrate or ambient air temperature is less than 50 degrees F nor more than 80 degrees F.

B. Maintain minimum ambient temperature of 50 degrees F during and after installation of plaster.

C. Do not apply plaster during wet weather, or when wet weather conditions can be forecast reasonably or during periods of high winds.

D. Proper and acceptable curing of plaster shall be Contractor's responsibility. Maintain continued water spray curing as specified herein, during weekends or holidays at no extra cost to Owner.

PART 2 PRODUCTS

2.01 PLASTER BASE COAT MATERIALS

A. Cement: ASTM C150, Normal - Type I or Type II.

B. Lime: ASTM C206 or ASTM C207 Type S.

C. Aggregate: Natural or manufactured sand conforming to ASTM C897, graded within following limits:

Sieve Size	Percent Retained
No. 4	0
No. 8	0 to 10
No. 16	10 to 40
No. 30	30 to 65

No. 50	70 to 90
No. 100	95 to 100

D. Water: Clean, fresh, potable and free of mineral or organic matter that can affect plaster.

E. Bonding Agent, Exterior: ASTM C932; WELD-CRETE, manufactured by Larsen Products Corp., Rockville, MD, or equal as approved in accordance with Section 01600 for Substitutions.

F. Plasticizers: Only approved plasticity agents and approved amounts thereof may be added to portland cement. Hydrated lime or equivalent amount of lime putty used as plasticizer may be added to portland cement plaster not to exceed that set forth in Table 25A-F, California Building Code.

G. Glass Fibers: ASTM C1116, Alkaline resistant glass fibers, 1/2inch long, free from contaminates, manufactured for use in portland cement plaster.

2.02 PLASTER FINISH COAT MATERIALS

A. Premixed Finishing Coat: EXTERIOR COLOR COAT, manufactured by La Habra Stucco, Anaheim, CA, [Marlex Stucco] color as selected from manufacturer's standard list, or equal as approved in accordance with Section 01600 for substitutions.

B. Water: Clean, fresh, potable and free of mineral or organic matter that can affect plaster.

C. Unless otherwise noted, pigmented finishing coat shall match paint color and be painted under Section 09910.

2.03 FURRING AND LATHING

A. At exterior walls:
   1. Self-Furring Paper-Backed Lath: Welded wire, Grade D 60 min. waterproof fire resistive vapor barrier building paper backing, Type SFB self furring, zinc coated galvanized, 16 by 16 gage, 2 inch mesh, weight 1.84 pounds per square yard. STUCCO-RITE, ICBO 1254, manufactured by K-Lath, Fontana, CA, or equal as approved in accordance with Section 01600 for substitutions.
      a. Required: Heavy duty version with 11 gage stiffener wire at 6 inches on center.
      b. Required: Furring nails to maintain ¼ inch from sheathing.

B. Waterproof Backing at Openings, Projections and Top of Parapets: Composite polyethylene film and rubberized asphalt, 25 mils thick, VYCOR PLUS flashing strips, by W.R. Grace Co., Cambridge, MA, or equal as approved in accordance with Section 01600 for substitutions.

C. At soffits and horizontal surfaces; Metal Lath: 3.4 pounds per square yard expanded metal, 3/8 inch high, cut from hot-dipped galvanized, self-furring type; ribbed type.

D. Corner Mesh: Expanded steel mesh, shaped to permit complete embedding in plaster; minimum 3 inches wide; galvanized finish.

E. Strip Lath: Expanded steel mesh, 4 inches wide, galvanized finish.

F. Corner Beads: Formed steel, minimum 26 gage thick, beaded edge, expanded steel mesh flanges, of longest possible length; sized and profiled to suit application; zinc alloy galvanized finish at exterior conditions.

G. Base Screeds: Formed steel, minimum 26 gage thick; square edge, of longest possible length; sized and profiled to suit application; galvanized finish.

H. Foundation Weep Screed: Formed steel, minimum 26 gage thick, holes to relieve trapped moisture, lower return flange; 3-1/2 inches below foundation plate line galvanized finish. Install minimum 4 inches above earth or 2 inches above paved areas.

I. Casing Bead: Formed steel; minimum 26 gage thick; thickness governed by plaster thickness; maximum possible lengths; expanded flange with square edges; galvanized finish.

J. Control and Expansion Joint Accessories: Formed galvanized steel; minimum 28 gage thick.
1. Crack Control Joints, Stress Relief: Install every 10 feet vertically and horizontally. Use Superior No. XJ15-3, 7/8 inch ground type
2. Expansion Joints: Install every 20 feet and as indicated on Drawings. Use Superior No. 40 2-piece, 7/8 inch ground type.

K. Anchorage: Nails, staples, or other approved metal supports, of type to suit application, galvanized to rigidly secure lath and associated metal accessories in place; minimum penetration into wood supports 5/8 inch.
1. At Vertical Surfaces:
   a. Furring Nails: 1-1/2 inch, 11 gage galv, 7/16 inch head, barbed.
   b. Staples: not permitted.
   c. Tie Wire: 18 gage annealed, galvanized.
2. At Horizontal Surfaces:
   a. Nails: 1- 1/2 inch, 11 gage, 7/16 inch head, barbed.
   b. Staples: 9 gage, ring shank, hook type, 5/8 inch crown, 1-1/2 inch leg. (Washburn & Moen wire gage standard).
   c. Tie Wire: 18 gage annealed wire, galvanized, double strand.

L. Reveal Moldings: Reveal Moldings: Extruded aluminum reveal moldings as detailed and as manufactured by Fry Reglet Company, Alhambra, CA or as approved. All intersections shall be factory fabricated with joints heliarc welded and backs sealed with permanent waterproof tape. Furnish with 6 inch legs to join with straight

sections. Provide connector clips and sealant at butt joints of straight sections. Color as selected by Architect.

M. Soffit Vents: Extruded aluminum 4 inch soffit vents, Flannery, Inc., San Fernando, CA.

N. Drip Screed: At soffits and between floors, preformed 26 gauge galvanized.

O. Self Weeping Window/Door Drip: 26 gage galvanized.

2.04 HORIZONTAL METAL FRAMING

A. General: Size metal ceiling supports to comply with the following, unless otherwise indicated.

B. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper. Minimum 8-gage wire for hangers, 14 gage wire for ties.

C. Load bearing (Transverse and Axial) Studs and Runners: ASTM C 955 and complying with the following requirements for quality, grade and finish of steel sheet, for design thickness of base metal (uncoated); and other dimensional characteristics.
1. Metal Quality: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A653M. Coating Designation G60, for grades indicated below.
   (a) Grade D (33,000 psi yield point) for design thickness of 0.0478 inches (18 gage) or less for interior or exterior construction. Use minimum 4 inch steel studs.
   (b) Grade D (50,000 psi yield point) for design thickness of 0.0598 inches (16 gage) or more.
   (c) Use only Grade D studs and runners for exterior soffit construction. Use minimum 4 inch steel studs.

D. Furring Channels: Cold-rolled steel, 0.0598 inches min, thickness of base metal (uncoated), allowable bending stress of 18,000 psi, protected with galvanizing complying with ASTM A653/A653M for G90 coating designation, and as follows:
1. Furring Channels: 3/4 inches deep x 7/16 inches wide flanges, 316 lbs. per 1000 feet galvanized.
2. Provide galvanized channels for all installations.

E. Anchorage Devices: Screws, cast-in-place concrete inserts or other devices appropriate for anchorage to the form of structural framing indicated and whose suitability for use intended has been proven through standard construction practices or certified test data.
1. Size devices to develop full strength of hanger but not less than 3 times calculated hanger loading, except size direct pullout concrete inserts for 5 x calculated hanger loading.

F. Uplift Bracing: Provide uplift bracing at all exterior soffits as detailed on drawings, or maximum 4'-0" o.c. each direction. Use steel studs for uplift bracing of same size and gage as horizontal stud framing. Uplift bracing shall be based on requirements to resist wind loads per ASCE 7 and FBC.

2.05 CEMENT PLASTER MIXES

A. Mix and proportion portland cement plaster in accordance with Table 2511.1.1, California Building Code and ASTM C926.

B. Scratch: 1 part cement and maximum 4 parts sand to max. 20 pounds maximum weight (or volume) lime per volume cement, add glass fibers per manufacturer's recommendation, 2 lbs max.

C. Brown Coat: 1 part cement and maximum 5 parts sand to max. 20 pounds weight (or volume) lime per volume cement, add glass fibers per manufacturer's recommendation, 2 lbs max.

D. Finish Coat: Pre-mixed to manufacturer's recommendations.

E. Ensure uniformity of mix and coloration.

F. Mix materials dry to uniform color and consistency before adding water.

G. Protect mixtures from frost, contamination and evaporation.

H. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that surfaces and site conditions are ready to receive Work.

B. Grounds and Blocking: Verify items within walls for other Sections of Work have been installed.

C. Mechanical and Electrical: Verify services within walls have been tested and approved, otherwise uncover at no extra cost to Owner.

D. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Protect floors, walls, trim and other surfaces near Work of this Section from damage or disfiguration.

B. Scaffolding: Construct and maintain in conformance with applicable laws and ordinances.

3.03 INSTALLATION - LATHING MATERIALS

A. Apply ribbed lath with self-furring ribs perpendicular to supports at soffits and horizontal surfaces. Lap sides of ribbed lath minimum 1-1/2 inches. Nest outside ribs of rib lath together. Attach lath to wood supports using specified nails and staples at maximum 6 inches on center.

1. At horizontal metal lath application, secure lath to each support with specified nails and staples, with staples placed around 10d galvanized common nail laid flat under surface of lath not more than 3 inches from edge of each sheet. 10d nail may be omitted when staple is placed over back wire of welded wire fabric or over ribs of 3/8 inch rib lath.

B. At vertical supports, apply self-furring paper-backed lath shingle style with self-furring rib perpendicular to supports. Install furring nails at 3 inch centers, stagger vertical laps. Install furring nails at lath wire “high” location away from the designated fastener location, hold lath 1/4 inch away from vertical supports. Staples not permitted.

C. Where self-furring Grade D paper-backed lath is applied over wood base sheathing, apply one additional layer of Grade D 60 minute, asphalt saturated paper in accordance with Section 2510.6, California Building Code.

D. Continuously reinforce internal angles with corner mesh, except where metal lath returns 3 inches from corner to form angle reinforcement. Fasten at perimeter edges only.

E. Place beaded external angle with mesh at corners. Fasten at outer edges only. Place 12 inch wide strip of specified composite polyethylene film around all exterior openings. Flash in such a manner as to make openings weatherproof.

F. Place strip lath diagonally at corners of lathed openings. Secure rigidly in place.

G. Place strip lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

H. Place casing beads at terminations of plaster finish. Butt and align ends, cope or miter at corners. Secure rigidly in place, maximum 12 inches on centers.

G. Install accessories to lines and levels.

I Install weep screeds at foundation and between floors.

3.04 CONTROL AND EXPANSION JOINTS

A. Locate exterior crack control joints every 10 feet in each direction and as indicated on Drawings. Install 12 inch wide strip of specified paper behind each joint.

B. Locate expansion joints 20 feet on center and as indicated on Drawings. At expansion joints 2 stud construction is required behind joint. Discontinue lath behind joint and apply 2 layers of sheathing paper, 18 inches wide and 12 inches wide entire

length of joint.

C. Establish control and expansion joints with specified joint device.

D. Joint placement shall be approved by Architect before plastering.

E. Apply sealant at splices, intersections and terminals in accordance with Section 07 92 00.

3.05 PLASTERING

A. Apply plaster in accordance with Chapter 25, California Building Code.
   1. Measuring Ingredients: Proportion and measure ingredients by means of calibrated boxes or containers of such nature that quantities measured can be readily and accurately checked at any time. Proportioning by shovel measure is not acceptable.
   2. Mixing Plaster: Mix plaster by machine for minimum of 2 minutes. Mix no more plaster than can be properly placed within 1/2 hour after mixing. Allow no material to remain overnight in mixers or mixing boxes. Thoroughly clean tools and implements used in mixing and transporting plaster.

B. Apply scratch coat to nominal thickness of 3/8 inch, brown coat to nominal thickness of 3/8 inch, and finish coat to nominal thickness of 1/8 inch over metal lathed surfaces.

C. Moist cure scratch and brown coats minimum 48 hours each coat.

D. After curing, dampen base coat prior to applying finish coat.

E. Apply finish coat and steel trowel to smooth and consistent finish. Apply after brown coat has cured minimum 7 days.

F. Finish Coat Texture: Medium Sand Float, as defined in "Plaster Textures" publication of Lath, Plastering and Drywall Information Bureau, Los Angeles, CA.

G. Avoid excessive working of surface. Delay trowelling as long as possible to avoid drawing excess fines to surface.

H. Moist cure finish coat for minimum period of 48 hours. Use fine fog spray, in sufficient quantity to be absorbed by plaster only. Do not damage surfaces or permit evaporation during dry weather.

3.06 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry

B. Section 07 21 00, Thermal & Acoustical Insulation

C. Section 07 92 00, Joint Sealants

D. Section 08 11 13, Hollow Metal Doors and Frames.

E. Section 08 30 50, Access Doors & Panels.

F. Section 09 24 00, Cement Plastering.

G. Section 09 91 23, Interior Painting.

H. Division 15 and 16, Related Mechanical and Electrical Work.

1.03 QUALITY ASSURANCE

A. Use only new materials and products.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: Submit sample for each type of finish texture to Architect for review per Section 01 33 00.

D. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Guarantee Period shall be two (2) years.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. Gypsum Association publication GA-210-85.

C. Gypsum Association publication GA-600-12, Fire Resistance Design Manual.

D. Gypsum Association publication GA-216-89, "Recommended Specifications for the Application and Finishing of Gypsum Board".

E. Underwriters' Laboratories, Fire Resistance Directory, latest edition.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations. Materials are to be neatly stacked flat, avoiding undue sag or damaged to board surfaces or edges.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Do not install wallboard or joint compounds when building temperature is below 55 degrees F or if proper ventilation is not provided to eliminate excessive moisture from building.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Gypsum Wallboard:

1. Fire resistant Type "X" Gypsum Wallboard: ASTM C-36 and ANSI A69.1; USG Sheetrock Firecode "C" Core with SW edge, Domtar Gyproc Fireguard Type X, Gold Bond Fire-Shield Sta-Smooth, or approved equal; round tapered edge, 5/8 inch thick fire-rated with U.L. label unless otherwise indicated.

    a. Use on all walls except as otherwise noted.

2. Water Resistant Type "X" Gypsum Wallboard: ASTM C-630 and ANSI A69.1; USG Sheetrock Firecode "C" Core, Domtar Gyproc Moisture-Guard Type X, Gold Bond MR Fireshield, or approved equal; moisture resistant board, round tapered edge, 5/8 inch thick fire-rated with U.L. label unless otherwise indicated.

    a. Use on all walls at restrooms, toilet rooms, shower rooms, locker rooms, janitor closets, kitchens and other locations as noted for water resistive conditions.

3. Impact Resistant Type “X” Gypsum Wallboard: ASTM E-136, ASTM E-84 and ASTM E-119. Fiberrock Brand VHI Abuse-Resistant Gypsum Panels, 5/8" thick with tapered edge as manufactured by USG Corporation.

4. Exterior Gypsum Sheathing: ASTM C-79 and ANSI A69.1; USG Gypsum Sheathing, Gold Bond Gypsum Sheathing, or approved equal; Type "X", T & G 5/8" asphalted core, water repellent paper surface both sides unless otherwise indicated.

    a. Use at exterior wall and at locations as indicated.

B. Metal Accessories: Fabricated from galvanized steel; suitable for intended use.

1. Corner Beads: USG Dur-A-Bead #103, or approved equal, size 1-1/4" x 1-1/4".

2. Casing Bead: USG Series No. 200-B, or approved equal.

3. Exposed Edge Trim: USG Series No. 200-A with back flange or approved equal.

4. Metal Furring Channels: USG Metal Furring Channels, Dale FC-7/8, Gold Bond Furring Channel or approved equal 7/8 inch deep x 1-1/4 inch face width resilient metal furring channel.

5. Expansion Joint: USG No. 093 Control Joint, Gold Bond E-Z Expansion Joint, equivalents by Beadex or Domtar or approved equal.

6. Others as indicated on the Drawings and as recommended by reference standards.

C. Fasteners:

1. Screws: Gypsum Wallboard to metal furring channels, use 1" length hilo type S, bugle head. Gypsum wallboard to gypsum wallboard, use 1-1/2" length type G, bugle head. Gypsum wallboard to wood, use 1-1/4" length, bugle head. Gypsum wallboard to metal studs, use 1" length hilo type S, bugle head for 20 gauge or less and 1-1/8" length type S, bugle head for studs greater than 20 gauge. Others as required and recommended by gypsum wallboard manufacturer and in accordance with the specified standards.

2. Nails: Phosphate etched, concave head, steel wire nails, especially made for attachment of gypsum boards; for 1/2" board, use 1-3/8 inches long x 14 ga.; for 5/8 inch board, use 1-7/8 inches long x 13 ga.; for sheathing, use 1-5/8 inch galvanized roofing nails.

3. Spacing shall be in accordance with CBC Table 25A-G and 25A-H.

D. Joint System Materials: Conform to ASTM C475.

1. Tape: USG Sheetrock Brand Joint Tape or approved equal.

2. Joint compound: USG Sheetrock Brand Joint Compound - Taping, or approved equal.

3. Joint finishing compound: USG Sheetrock Brand Joint Compound - Topping, or approved equal.

E. Prime Coat: USG Sheetrock First Coat or approved equal. Use only for smooth wall, not required for a textured/stipple wall.

F. Interior wall sealant: Highly elastic, water-based compound, specifically formulated for acoustical sealing. Non-bleeding, non-staining, pumpable and easily applied in beads; Tremco Acoustical Sealant, Presstite 579.64; or approved equal.

G. Vinyl Covered Tackable Panels: Masonite Industrial Board as distributed by Cal Ply of West Sacramento, CA (916) 371-3341 or approved equal. 1/2" cellulosic, tackable fiberboard base with tapered edges. Provide factory primed face and ironed back with Class C rating, 150 maximum flame spread index and 85 maximum smoke development index per ASTM 84. Wrap panels with vinyl wall covering as manufactured by Koroseal “Spellbound” or approved equal. Provide vinyl covered molding to match.

H. Fiberboard Base/Tackboard: Masonite Industrial Board as distributed by Cal Ply of West Sacramento, CA (916) 371-3341 or approved equal. 1/2" cellulosic, tackable fiberboard base with tapered edges. Provide factory primed face and ironed back with Class C rating, 150 maximum flame spread index and 85 maximum smoke development index per ASTM 84.

I. Adhesives shall be per gypsum wallboard manufacturer's recommendations.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Report unacceptable sub-surfaces to Contractor for corrective action before proceeding with installation. Starting of work will indicate acceptance of such sub-surfaces.

B. Surface acceptance: After application of sealer, surfaces shall be checked for surface damage, defects or uneven walls. Uneven walls shall mean those that are not straight, plumb or of even true plane. Such discrepancies shall be corrected prior to application of further wall decoration.

3.02 COORDINATION

A. Coordinate work to avoid delays and interference with work of mechanical, electrical and other trades.

3.03 WORKMANSHIP

A. Workmanship shall be of highest quality. Joints, corners, screws and nail heads shall be finished with long tapered finish, smooth and even in texture. Surfaces shall be prepared to receive paint finish.

3.04 INSTALLATION

A. Fire-resistive ratings: Where fire rated construction is indicated, install wallboard assembly to provide fire-resistive rating required.

B. Sheet arrangement layout: Conform to layouts and requirements indicated; use long sheets to restrict joints to minimum. Conditions met and not covered by plans and specifications shall be resolved in conformity with best practice of trade.

C. Joints: Butt sheets loosely together with tapered edges always placed together (butt edges placed next to tapered edges are not permitted). Sand or kerf cut edges and mill ends to provide smooth jointing on exposed face. Stagger end joints. Shim wallboard on wood framing to get even joints without offsets.

D. Fasteners: Place fasteners no less than 3/8 inch from edges of boards. Install fasteners with heads dimpled slightly below surface; do not cut through paper. Use crown face hammers for driving nails and approved power tools for self drilling screws. Fasten gypsum wallboard to all bearings as follows:

1. Ceilings, Non-rated: Nails, 7 inches o.c., screws 12 inches o.c.

2. Walls, Non-rated: Nails, 8 inches o.c.; screws 12 inches o.c.

3. Ceilings, One-hour Rated: Nails, 6 inches o.c.; screws 8 inches.

4. Walls, One-hour Rated: Nails 7 inches o.c. all bearings; screws 8 inches o.c. at edge bearings, 12 inches o.c. at field bearings.

E. Ceilings: Place boards with long dimension at right angles to supports and end joint occurring over supports. On fire rated ceilings butted end joints may be placed between supports and reinforced on upper side with 8 inch wide wallboard back up strips set in approved adhesive. Place perimeters of ceilings and edges of openings over solid bearing members.

F. Partitions: Place boards with long dimensions either vertical or horizontal (but not combination of both) on studs. Stagger vertical joints on opposite sides of partitions. Locate joints at least 12 inches from jambs of openings. Keep end joints to minimum.

G. Cutting and scribing: Cut neatly to fit around outlets, switch boxes and other protrusions, using keyhole saw or specially designed cutting tool for opening of exact shape and size needed.

H. Trim: Edge exterior corners with specified bead set to true plumb line. Where wallboard joins or abuts any material other than wall board, cover end of board with specified metal casing, leaving joint sufficient for installation of sealant. Attach per manufacturer’s recommendations. No clenching allowed.

I. Interior Wall Sealant: At all interior partitions, use double bead of specified material. Install at floors, wall intersections, where walls abut other materials and at all electrical boxes. Apply in accord with manufacturer's printed directions.

J. Fixture Enclosures: Provide 1 hour enclosures of 5/8 inch thick UL labeled wallboard around all fixtures in ceilings with one hour fire rating.

K. Fiberboard (Tackboard) Base: Apply vertically. Glue and nail to gypsum board backing with 5d nails at 12 inches o.c. at supports with nails dimpled, leaving 1/8 inch gap between boards. Fill gap between boards with hardening-type patching compound such as "Fixall" with maximum hardening time of 1-1/2 hours. Allow material to dry for 24 hours. Tape and finish joints and nail depressions as specified for gypsum board application, leaving surfaces ready for priming and application of vinyl wall covering.

L. Gypsum Board Inserts for Suspended Grid Ceiling: Cut gypsum board panels for snug fit in ceiling grid. Apply metal casing beads to all edges, mitered at corners, and deliver to painting contractor for painting before installation under Section 09900.

M. Resilient Metal Clips: Fasten to wall at 24 inches o.c. maximum. Position clips within 4 inches of floor and ceiling. Metal clip spacing not to exceed 24 inches o.c. Apply gypsum board to channels using 1 inch long U.S.G. Type S screws spaced 12 inches o.c. with horizontal abutting edges centered over clip screw flange.

N. Gypsum Sheathing: Apply horizontally and fasten by nailing with 1-5/8 inch galvanized roofing nails at 8 inches o.c. each bearing.

O. Interior Masonry and Concrete Walls: Apply adhesive directly to the back of the gypsum board or on the wall in continuous beads not more than 12" o.c. or daubs spaced not exceeding 12" o.c. each way. Beads shall not be less than 3/8" in diameter to provide continuous bond between the gypsum board and the wall surface. Daubs shall be 2" to 3" in diameter. Gypsum board shall be positioned 1/8" from the floor and provide a tight fit at abutting edges or ends. Do not slide the gypsum board. Use mechanical fasteners or temporary bracing to support gypsum board until adhesive sets. Delay the joint treatment until the gypsum board is firmly bonded.

3.05 FINISHING

A. Finish all joints, screw and nailhead depressions, applied metal trim and surface blemishes, applying tape and compounds in strict accord with manufacturer's printed directions.

B. All exposed wallboard shall be finished and sanded as necessary to provide flat, smooth surface ready for decoration.

C. Wallboard which will be covered by panels or wall-fastened casework and wallboard which is above level of finished ceiling, shall be taped, but need not be finished and sanded smooth.

D. Smooth Finish: At exposed gypsum wall board and plaster surfaces in Toilet Rooms, Kitchens and other areas as scheduled.

1. Apply full coat of prime coat over entire surface, paint as specified in Section 09900.

E. Spray Texture Coat: At all exposed gypsum wall board and plaster surfaces, not scheduled for smooth finish.

1. Unless otherwise specified or scheduled, apply the single-coat spray texture to all surfaces in a degree of texture approved by the Architect to match approved sample.

No texture shall be applied until approved in writing by the Architect.

2. Finish Texture: Spray texture shall be as follows:

   a. Walls: Orange peel.

   b. Ceilings: Orange peel.

F. Gypsum wallboard to receive wood paneling or vinyl wall covering, or similar thin flexible coverings shall receive finish topping and sanding and shall be left in a smooth condition, free of surface imperfections, ready to receive the specified wall covering.

3.06 ADDITIONAL REQUIREMENTS

A. Accessories and Light Fixture Protection: Wherever accessories, panels and recessed light fixtures penetrate fire-rated gypsum wallboard, provide protection box assembly in accordance with UL specifications and as detailed to maintain integrity of rated wall/ceiling system.

B. Access Panels: Fabricate, install to detail. Refer to Section 08305 and Mechanical and Electrical work under Divisions 15 and 16.

C. At wall/floor joints greater than 3/16", fill void completely to provide solid backing for floor base.

3.07 PROTECTION

A. Protect work and materials of this Section prior to and during installation and protect the installed work and materials of other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

3.08 CLEAN-UP

A. Remove all empty containers, scraps of material and all other debris, and leave premises broom clean. Clean all adjoining work spotted or otherwise defaced by this operation.

END OF SECTION

RESILIENT FLOORING & BASE

Section 09 65 13
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 30 0, Cast-In-Place Concrete, for concrete finishing.

B. Section 08 71 00, Door Hardware

1.03 REFERENCES

A. Armstrong Flooring Technical Manuals

B. Armstrong Flooring Guaranteed Installation Systems manual, F-5061

C. ASTM International:
1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
4. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
5. ASTM F 1700 Standard Specification for Solid Vinyl Tile
6. ASTM F 1861 Standard Specification for Resilient Wall Base
7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

A. National Fire Protection Association (NFPA):
1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials
3. ASTM F 710: Practice for Preparing Concrete Floors to Receive Resilient Flooring.

1.04 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including moisture mitigation systems, primers, leveling and patching compounds, and adhesives.

C. Select an installer who is experienced and competent in the installation of Armstrong resilient solid vinyl tile flooring and the use of Armstrong Flooring subfloor preparation products.
1. Engage installers certified as Armstrong Commercial Flooring Certified Installers

2. Confirm installer's certification by requesting their credentials

D. Fire Performance Characteristics: Provide resilient tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:
   1. ASTM E 648 (NFPA 253) Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
   2. ASTM E 662 (NFPA 258) (Smoke Generation) Maximum Specific Optical Density of 450 or less
   3. CAN/ULC-S102.2 – Flame Spread Rating and Smoke Developed – Results as tested

D. All materials, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement

E. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.

F. Administrative Requirements

   a. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

   b. Pre-installation Testing: Conduct pre-installation testing as follows: Moisture tests, bond test and pH test.

1.05 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions (latest edition of Armstrong Flooring Guaranteed Installation Systems manual, F-5061. for flooring and accessories. Include published warranty or guarantee.

C Submit Safety Data Sheets (SDS) available for adhesives, moisture mitigation systems, primers, patching, leveling compounds, floor finishes (polishes) and cleaning agents and Material Information Sheets for flooring products

D. Samples: The following samples are required. Submit per Section 01 33 00.

   1. Submit sample for each type of resilient flooring (min. 4" x 6" for tile and 4" x 6" for sheet) and base (min. 2" x height) to Architect for review.

   2. Manufacturer's full range of colors for Architect's selection. Architect may select more than one color.

   3. Submit full size samples of materials in selected color(s); tile, 12" x 24"; base, 48"

length.

D. Shop Drawings: Submit shop drawings showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Show layout of each area to be covered with flooring materials with locations of seams, edge strips and indicating adjacent materials where applicable. Show flooring patterns and layouts coordinated with color selections.

E. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

F. Maintenance and Operating Manual: Include manufacturer's written recommendations for care, cleaning and maintenance of each type of material installed.

1.06 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Guarantee period shall be 2 years from date of filing Notice of Completion. Include unconditional guarantee against loss of bond between rubber base and wall.

D. Limited Warranty Period: 20 years for Echange™ Luxury Flooring.

E. Limited Warranty Period: 20 years for Unbound with Diamond 10 Technology Coating.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver the flooring to the installation site in manufacturer’s original packaging. Indicate the project name and handling instructions on the outside of the boxes.

B. Advise the carrier of any damaged material and indicate it on the packing slip.

C. Store the flooring inside, sheltered from extreme hot or cold temperatures. Place the material on a smooth level floor or where there is uniform solid support in a clean, dry well-ventilated area. Unstack the palettes. The long-term storage temperature must be maintained between 18°C (65°F) and 24°C (75°F). Protect adhesive and flooring material from freezing, extreme heat and direct sun exposure.

D. Acclimatize the subfloor, all flooring material and adhesive for 48 hours before, during and after the installation by maintaining the room temperature between 18°C (65°F) and 24°C (75°F). The palettes should be unstacked 24 hours prior to use.

E. Afterwards, maintain the room temperature between 18°C (65°F) and 29°C (85°F). Protect the material from direct sources of heat such as air vents and other types of heaters.

F. Install the flooring after all other finishing work, including painting, have been completed.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Do not install materials unless ambient temperature of 70 degrees F is maintained 72 hours prior to and during laying and until all materials have been stored at site for 72 hours at that temperature.

B. Do not apply materials on wet or damp surfaces.

C. Defer laying until other work that might cause damage to flooring has been completed.

1.09 QUALIFICATIONS

A. For installation of flooring products, use installers approved by the manufacturer properly skilled and completely familiar with the products and the manufacturer's recommended methods of manufacturer and installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Resilient Tile Flooring

1. Manufacturer: Armstrong Flooring Inc., 2500 Columbia Avenue, Lancaster, PA 17604, www.armstrongflooring.com/commercial
    1. Product: Biome™ Luxury Flooring manufactured by Armstrong Flooring Inc.
        a. Description: A layered construction consisting of a tough, clear, rigid vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a diamond-infused UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
        b. Reference specification - ASTM F 1700, “Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface. Meets requirements for size, squareness, thickness, thickness of wear layer, residual indentation, resistance to chemicals, resistance to light and resistance to heat.
        c. Pattern and Color: in [%COLOR%] [color selected from the range currently available from Armstrong Flooring Inc.]
        d. Size: [36 in. x 6 in. (914.4 mm x 152.4 mm)].
        e. Wear layer thickness: 0.020 (0.5 mm)
        f. Thickness: 0.100 in. (2.5 mm)
    2. Unbound with Diamond10 Technology Coating: Luxury Solid Vinyl Tile.
        a. Description: A layered construction consisting of a tough, clear, vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
        b. Luxury Solid Vinyl Tile shall conform to the requirements of ASTM F 1700, “Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface.
        c. Pattern and Color: in [%COLOR%] [color selected from the range currently available from Armstrong Flooring Inc.]

d. Size: [36 in. x 36 in. (914.4 mm x 914.4 mm)] [9 in. x 59 in. (228.6 mm x 1498.6 mm)] [7 in. x 59 in. (177.8 mm x 1498.6 mm)]
e. Wear layer thickness: 0.020 (0.5 mm)
f. Thickness: 0.200 in. (5mm)

3. Natural Creations Luxury Solid Vinyl Tile Flooring manufactured by Armstrong Flooring Inc.
   a. Description: A layered construction consisting of a tough, clear, rigid vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a diamond-infused UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
   b. Reference specification - ASTM F 1700, “Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface. Meets requirements for size, squareness, thickness, thickness of wear layer, residual indentation, resistance to chemicals, resistance to light and resistance to heat.
   c. Pattern and Color: in [%COLOR%] [color selected from the range currently available from Armstrong Flooring Inc.]
   d. Size: [36 in. x 6 in. (914.4 mm x 152.4 mm)] [48 in. x 6 in. (1219.2 mm x 152.4 mm)] [48 in. x 9 in. (1219.2 mm x 228.6 mm)] [12 in. x 24 in. (305 mm x 609.6 mm)][18 in. x 18 in. (457.2 mm x 457.2 mm)] [18 in. x 36 in. (457.2 mm x 914.4 mm)].
   e. Wear layer thickness: 0.020 (0.5 mm)
   f. Thickness: 1/8"/0.125 in. (3.2mm)
4. Adhesives: Provide manufacturer recommended adhesives.

B. Luxury Vinyl Plank (LVP) Flooring

1. Manufacturer: Metroflor Corporation, 15 Oakwood Avenue, Norwalk, CT 06850, www.metroflor.com

2. Product: “Deja New”, 20 Mil, Glue-Down, Luxury Vinyl Flooring. Color as selected by Architect from all available colors

09 67 23 Resinous Wall and Floor Coat

C. Rubber Base: As manufactured by Johnsonite, Flexco Company, or approved equal. Provide cove base for resilient flooring; carpet base where carpet occurs. Cope inside corners and wrap outside corners. Preformed exterior corners are not acceptable. Provide base in continuous 120 foot rolls; straight 4 foot lengths will not be allowed. Architect may choose from complete range of manufacturer’s colors.

D. Reducer & Transition Strips: Manufacturer and color to match manufacturer and color of wall base. Provide rubber reducer or transition strip as is appropriate for flooring type and thickness. Provide thickness to match thickness of tile where tile occurs. Use tapered or bullnose edge.

F. Adhesives: Moisture and alkali resistant, as recommended by material manufacturer for particular material and installation condition; proceed with primer where recommended by flooring material manufacturer. Verify that all adhesives intended for use will be compatible

with any chemical residues remaining on the floor surface following asbestos abatement operations.

G. Other materials: All other materials, including adhesives and cored base metal edge, not specifically described but required for a complete and proper installation of resilient flooring, shall be only as recommended by the manufacturer of the material to which it is applied.
   1. Subfloor repairs: use a good-quality Portland cement-based compound modified with latex that has a minimal resistance to compression of 246 kg/cm^2 (3 500 lbs/sq. in.) to fill, smooth or level subfloor imperfections.
   2. Self-levelling underlayment: use a Portland cement-based self-levelling underlayment modified with a polymer that has a minimal resistance to compression of 246 kg/cm^2 (3,500 lbs/sq. in.).

PART 3 - EXECUTION

3.01 SITE INSPECTION

A. Prior to all work of this Section, carefully inspect the installed work of other trades and verify that all work is complete to the point where this installation may properly commence. Work of all other trades, including painting, shall be substantially completed before start of laying flooring and permanent heating system must be in operation.

B. Examine the subfloor before installation to ensure that the surface is clean, dry, smooth, structurally sound and free from foreign substances that may adversely affect adhesion or cause discoloration. Furthermore, ensure that the subfloor is free of paint, varnish, adhesive, oil, grease, solvent and other foreign substances, including treatment compounds, sealers and curing compounds that may adversely affect adhesion or alter the appearance or durability of the rubber flooring.

C. Verify the surface to ensure there is no powder, scaling or mold. If there is, remove it with a mechanical sander and level with a good-quality cement-based Portland primer.

D. Slabs that have been either using a curing agent or a sealer will have to be treated to ensure that the adhesion has not been impaired.

E. Do not install on cement slabs that have been subjected to adhesive chemical abatement, unless an approved remediation system was used afterwards.

F. Report and rectify all unsatisfactory conditions. Do not start flooring installation until all rectifications have been completed.

3.02 SUBFLOOR PREPARATION

A. Level all rough surfaces and fill cracks and marks with a Portland cement-based patching compound modified with latex.

B. Mechanically remove all surface contaminants such as paint, oil, grease, varnish, adhesive as well as various other products such as treatment compounds.

C. Measure the humidity and pH levels in the cement in compliance with the following standards before installation:

1. ASTM F 2170, Relative Humidity (RH) test using in situ probes.
2. ASTM F 710, pH levels (test procedure 5.3.1).
3. The ASTM test frequency recommendation is 3 measures for the first 1,000 sq. ft. (92.9 sq. m) and one measure for each additional 1,000 sq. ft. (92.9 sq. m).

D. Ensure Moisture, Relative Humidity and pH tests have all been conducted and measurements meet manufacturer's recommendations.

E. Test the adhesion on the cement subfloor or other surface that will be covered by the flooring. Do the test using the specified flooring and manufacturer's recommended adhesive.

F. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation of flooring or base in areas of discrepancy until all such discrepancies have been resolved.

G. Beginning of installation will imply acceptance of sub-floor by installer.

3.03 RESILIENT FLOORING INSTALLATION

A. Install the flooring according to the latest version of manufacturer's installation instructions. Use the tools, adhesives, trowel types and procedures recommended in the instructions.

B. Acclimatize the subfloor, all flooring material and adhesive for 48 hours before, during and after the installation by maintaining the room temperature between 18°C (65°F) and 24°C (75°F). Afterwards, maintain the temperature between 18°C (65°F) and 29°C (85°F).

C. Extend installation under open-bottomed obstructions, and under removable flanges, or obstructions. Extend into closets and alcoves of rooms, unless another floor finish is indicated for such spaces. Extend floor products under all moveable furniture, disabled accessible cabinets and equipment unless otherwise indicated. Scribe, cut and fit or flash flooring and cove to permanent fixtures, built-in furniture and cabinets, pipes and outlets, and permanent columns, walls and partitions as shown on the plans.

D. Tile: Install wall to wall and to fixed cabinets and casework. Install under freestanding equipment. Cut neatly to and around permanent fixtures.

1. Lay from centerline mark so that cut tiles at opposite sides of room are of equal width and cuts are as wide as possible. Layout shall be square and parallel with straight unbroken joint lines.
2. Alternate direction of tile pattern for each abutting tile in line. Fit tightly and accurately to vertical surface, floor plates, thresholds and edging strips with clean cuts.
3. Lay in color patterns, as shown on Drawings and indicated in these specifications. Flooring patterns and colors to be approved through shop drawing submittal process prior to installation.

3.04 BASE INSTALLATION

A. Base: In rooms where rubber base is designated, install on all base surfaces including around cabinets and other standing equipment, unless shown otherwise.

1. Apply base in accord with base manufacturer's printed directions. Tightly adhere to

substrate.

2. Set straight and level, joints closely fitted flush, top and bottom edges in firm, full contact with floor and wall, and entire backside bonded to wall. Scribe neatly to door trim or other edges. Verify wall extends to floor for full backing. Do not install base where voids or space exists at wall/floor joint. Fill voids due to seams in substrate materials with manufacturer's recommended filler material.

3. Minimum piece length 24 inches.

4. Exercise care to prevent staining of adjacent surfaces.

5. On masonry surfaces, at v-joints in concrete, or similar irregular surfaces, fill voids along top edge of base with adhesive filler material recommended by base manufacturer.

6. At gypsum board and fiberboard walls, **fill voids at wall/floor intersection** fully before installing base to provide complete backing of base. Do not install base with gap; this will result in deformation by furniture and will require removal and replacement of base.

7. Cope inside corners: Cut first piece square to the corner. Undercut and scribe the adjacent piece to the corner, attach per manufacturer.

8. Wrap outside corners: With top set gauge, remove portion of back side of base to the bend. Make two relief cuts, one on each side of the bend at the bottom of the base. Remove a tapered piece from the bottom of the toe. Attach per manufacturer.

F. Edging and Transition strips: Provide at all unprotected edges of floor covering or where floor covering transitions.

3.05 CLEANING AND PROTECTION

A. Remove all excess adhesive immediately after installation as recommended in the manufacturer’s installation instructions.

B. Before allowing traffic after installation, consult and follow the recommendations in Mohawk Group’s Installation Instructions.

C. Following installation and cleanup, if the work of all other trades has not yet been completed, protect the flooring by laying sheets of non-staining brown Kraft paper, and then a layer of plywood sheets (rolls of non-staining heavy cardboard material could also be used for protection).

D. Follow the manufacturer’s instructions when performing initial and regular maintenance procedures.

E. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

F. Provide a temporary non-staining paper pathway in all traffic areas.

G. Remove excess adhesive from walls and floors.

H. Clean up debris and remove from site.

3.06 EXTRA STOCK

A. Furnish three unopened boxes of each floor tile color from same lot as used in work. Mark boxes with manufacturer's name and color pattern.

B. Furnish one percent additional rolled base from same lot of each color utilized, 250 l.f. minimum. Mark boxes with manufacturer’s name and color pattern.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Provide and install multi-part resinous floor system, complete, as shown on Drawings and as specified, including:

1. Locations: Areas as indicated by the Plan finish schedule.

2. Provide preparation of substrate as recommended by the resinous flooring manufacturer.

3. Provide and install cove base with trims and accessories as specified in this Section.

4. Provide and install multi-part resinous floor system as specified in this Section.

5. Provide and install sealant joint material for the Work of this Section as specified in this Section.

6. Provide treatment of substrate cracks and control/construction joints as needed and specified in this Section.

1.02 SUBMITTALS

A. Comply with provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required.

1. Include certification that indicates compliance of materials with requirements.

C. Samples: Submit, for verification purposes, 5-inch square samples of each type of resinous flooring required, applied to a rigid backing, in color and finish indicated.

1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

D. Certificates: By manufacturer of resinous flooring; upon completion of Work, written statement that technical support to applicator and field supervision was sufficient to assure proper application of materials and that installation is acceptable.

E. Project References: Provide list of five projects in California where the applicator has installed the Manufacturer's product system in a commercial kitchen of similar size to this project's. Projects shall have been in service at least 12 months and include the project's name, location and point of contact to verify the quality of resinous flooring installation.

F. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.

1.03 QUALITY ASSURANCE

A. Qualifications of the Applicator: Licensed or approved by the manufacturer of the coating system and has successfully completed 5 projects of similar size and complexity.

B. Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this Section.

B. Special Requirements: Regulatory Agencies: Use materials for Work of this Section which comply with volatile organic compound limitations and other regulations of local Air Quality Management District and other local, state, and federal agencies having jurisdiction.

D. ISO 9001: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9001 registered quality system.

1.04 PRE-INSTALLATION CONFERENCE

A. Comply with requirements of Section 01 31 19 – Project Meetings.

B. Arrange a conference at the job site to coordinate resinous flooring and critical finish systems, to be attended by the General Contractor, Architect/Owner’s Representative and personnel involved in the actual manufacture as well as the installation of the Work in this Section and of the following Sections:

1. Section 03 00 00 – Miscellaneous Concrete
2. Section 06 20 00 – Finish Carpentry.
3. Section 08 11 13 – Hollow Metal Doors and Frames

1.05 PROJECT CONDITIONS

A. Type 1 concrete shall be properly cured for a minimum of 30 days. Type III concrete shall be properly cured for a minimum of 7 days. Concrete shall be tested for moisture-vapor-emission as detailed in Part 3 to determine if a moisture-vapor control membrane is needed.

B. Utilities, including electric, water, heat (air temperature between 60 and 85°F/16 and 30°C) and finished lighting to be supplied by General Contractor.

C. Job area to be free of other trades during, and for a period of 24 hours, after floor installation.

D. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.06 DELIVERY, STORAGE AND HANDLING

A. Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.

B. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors.

1. No on site weighing or volumetric measurements allowed.

C. Material shall be stored in a dry, enclosed area protected from exposure to moisture.

1. Temperature of storage area shall be maintained between 60 and 85-degrees F.

1.07 WARRANTY

A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) one full years from date of installation, or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) one full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

1. Resinous manufacturer representative shall return to project within 6 months to conduct inspection of resinous floor area.

PART 2 - PRODUCTS

2.01 RESINOUS FLOOR COATING

A. Colors:

1. As selected by Architect from manufacturer’s standard colors.

B. Resinous Flooring

1. Basis of Design: Urethane Resin Flooring with Decorative Quartz Finish applied at a minimum total thickness of 1/4” or approved equal.

    a. Manufacturer's Representative:
    Stonhard - (www.stonhard.com) ph: (800) 854-0310 Contact: John Wagner

C. System Components and Installation Steps: Manufacturer's standard components that are compatible with each other shall be installed as follows:

1. Urethane Mortar with Colored Quartz Broadcast:

    a. Formulation: Liquid-rich, self priming, textured, four component, polyurethane mortar system consisting of a urethane-urea binder, pigments and graded quartz aggregates with a broadcast application of brightly colored silica quartz aggregates.
    b. Application Method: Notched trowel and Spraycaster
    c. Minimum Application Thickness: 3/16”

2. Polyurethane Undercoat with Second Application of Colored Quartz Broadcast:

    a. Formulation: Two-component, clear, free flowing aliphatic polyurethane consisting of polyaspartic resin and an aliphatic isocyanate with a broadcast application of brightly colored silica quartz aggregates.
    b. Application Method: Silica quartz broadcast into a squeegee and medium nap roller applied undercoat.
    c. Minimum Application Thickness: 1/16”

3. Clear Polyurethane Finish Sealer:

    a. Formulation: Two-component, clear, UV light resistant, aliphatic polyurethane coating.
    b. Application Method: Squeegee and medium nap roller
    c. Minimum Application Thickness: 5-10 mils to achieve finish texture of approved sample submittals.

4. Physical Characteristics: Provide resinous floor system in which the minimum physical properties of resinous floor including aggregate, when tested with standards or procedures referenced below, are as follows:

1. Compressive Strength: 7,700 psi (ASTM C579)

2. Tensile Strength: 1,000 psi (ASTM C307)

3. Flexural Strength: 2,400 psi (ASTM C580)

4. Hardness: 80-84 (ASTM D2240/Shore D)

5. Thermal Coefficient of Linear Expansion: 13 x 10^{-6} in./in.°F (ASTM C531)

6. Heat Resistance: 200°F (Continuous), 250°F (Intermittent)

E. Expansion/Isolation Joint Sealant Materials:

1. Polyurethane Joint Sealant: Two-component, pourable polyurethane sealant with a minimum 400% percent elongation per ASTM D-638.

2. Backer Rod: Polyurethane foam rod or polyethylene backer rod one grade larger than the joint width.

F. Dynamic Cracks, Control and Construction Joints (if needed):

1. Two-component, flexilbilized epoxy membrane in conjunction with 10 ounce fiberglass engineering fabric.

G. Integral Coved Base:

1. Colored Quartz Mortar: Four-component, colored quartz epoxy mortar to match flooring with two-component finish sealer applied to the height indicated on Drawings and Finish Schedule.

2. Radius at floor/wall interface shall be at a ¾" minimum.

3. Metal Cove Termination Strip (optional): 1/8" x ½", "L" shaped, zinc or equivalent metal, cove strip fastened to wall substrate at cove height indicated on Drawings.

2.02 RESINOUS WALL COATING

A. Colors:

1. As selected by Architect from manufacturer's standard colors.

B. Resinous Wall Coating:

1. Basis of Design: Stonglaze VSF, Decorative wall system incorporating flakes in a high-performance clear topcoat or approved equal. Base coat consists of a two-component, polyurethane elastomer which receives flake broadcast. Clear topcoat consists of a two-component, aliphatic, polyurethane. Total system thickness equals 60 mils.

a. Stonhard Manufacturer's Representative:

John Wagner, phone: (800) 854-0310

PART 3 - EXECUTION

3.01 EXAMINATION

A. General: Examine substrate to receive resinous flooring; give written notification of deficiencies. Do not proceed until unsatisfactory conditions are corrected.

1. Substrate must be dry and free of all wax, grease, oils, fats, soil, loose or foreign materials and laitance.

   a. Laitance and unbonded cement particles must be removed by abrasive blasting, scarifying.
   b. Other contaminants may be removed by scrubbing with a heavy-duty industrial detergent, “Stonkleen DG9”, or equal; and rinsing with clean water.
   c. The surface must show open pores throughout and have a sandpaper texture.

B. Moisture Testing: Test horizontal substrates to determine acceptable dryness. Test method as recommended by resinous flooring manufacturer.

1. Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 85 percent.

2. Perform anhydrous calcium chloride test, ASTM F1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 6 lb per 1,000 sq. ft. per 24 hours.

3. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

   Test above provides a more accurate indication as to whether or not a concrete slab has dried sufficiently to allow finish flooring application than the tests below.

   For applying impermeable resinous flooring systems, 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) of slab in 24 hours is generally considered a safe moisture-vapor-emission rate. Consult manufacturers for appropriate rates for permeable systems that will allow moisture vapor to continue through them once cured.

3.02 PREPARATION

A. Surface Preparation: Concrete preparation shall be by mechanical means and include use of a scabbler, scarifier or shot blast machine for removal of bond inhibiting materials such as curing compounds or laitance.

3.03 MIXING

A. General: Mix components only in amounts that can be applied within recommended application life.

1. Discard materials not used within application life.

3.04 SYSTEM APPLICATION

A. General: Apply each component of resinous flooring system in compliance with manufacturer's written directions to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints (if any), indicated or required.

B. Resinous Flooring:

1. Mortar Base: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using manufacturer's specially designed screed applicator. Notched finishing trowels and spiked rollers are used to smooth the material to the required thickness. Brightly colored quartz aggregate is then broadcast into the wet mortar.

2. Undercoat with Second Broadcast: Remove excess unbonded granules by lightly brushing and vacuuming the floor surface. Mix and apply undercoat with strict adherence to manufacturer's installation procedures and immediately broadcast colored quartz aggregate into undercoat.

3. Clear Polyurethane Finish Sealer: Remove excess unbonded granules by lightly brushing and vacuuming the floor surface. Mix and apply sealer with strict adherence to manufacturer's installation procedures to both floor and coved base surfaces.

C. Integral Coved Base:

1. Mix and apply cove base mortar in conjunction with mortar base of resinous flooring at the height indicated on Drawings and/or Finish Schedule.

D. Expansion/Isolation Joints:

1. Stonflex MP7 Sealant: Mix and apply sealant to properly prepared cut joints (if any). The use of a polyethylene backer rod should be used in expansion and/or isolation joints. Sealant shall be applied at a depth of half the width of the joint.

E. Dynamic Cracks, Control and/or Construction Joints:

1. Stonproof CT5: Prior to installation of Resinous Flooring, mechanically rout cracks and joints to a depth of 3/8" minimum and at a 45 degree angle to create a "V" into the concrete substrate following the crack and/or joint. Apply Stonproof CT5 at a 30 mil thickness six inches on each side of crack or joint and filling the "V". Immediately place 10 ounce woven fiberglass engineering fabric into uncured Stonproof CT5 and saturate with additional Stonproof CT5 applied with a medium nap roller.

F. Resinous Wall System:

1. **Please Note: Several walls within this project require that the resinous wall system be installed over existing ceramic tile with gloss finish. Installer is responsible for the proper, manufacturer's required preparation of the existing ceramic tile, including any grinding or blasting of surface, floating of surface to hide grout lines and installation of manufacturer's primer if recommended.** Apply base coat to properly prepared substrate per manufacturer's recommended installation instructions. Broadcast flakes into uncured base coat to refusal. Allow base coat to cure. Lightly sand surface to remove unbonded flakes and apply clear finish sealer.

3.05 FIELD QUALITY CONTROL

A. The right is reserved to invoke the following material testing procedure at any time, and any number of times during period of flooring application.

1. The Owner will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.

2. Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.

3. If test results show materials being used do not comply with specified requirements, Contractor may be directed by the Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

3.06 PROTECTION OF ADJACENT WORK

A. General: Resinous floor system will be installed in locations where other adjacent finish materials, including ornamental metal, lath and plaster, and other finish assemblies may already be in place. Protect all adjacent surfaces during installation and finishing.

1. Installed adjacent finishes shall be completely isolated from epoxy coating

system installation. Provide Plastic ("Visqueen") wrap and mask all edges.

2. Provide constant supervision and immediate clean up throughout resinous floor system installation.

3. After resinous floor system has fully cured, remove protection from adjacent surfaces and wipe down surfaces using clean, cotton towels.

3.07 CURING, PROTECTION AND CLEANING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

1. Close area of application for a minimum of 24 hours.

B. Protect resinous flooring materials from damage and wear during construction operation.

1. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application.

2. General Contractor is responsible for protection and cleaning of surfaces after final coats.

C. Cleaning:

1. Remove temporary covering and clean resinous flooring just prior to final inspection.

2. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates listed in part, 3.6 Exterior Painting Schedule.

B. Paint, stain or otherwise finish all new surfaces. Paint all existing surfaces as indicated or scheduled on drawings. Work includes back priming of concealed surfaces, except as otherwise specified; and paint, repaint or finish any existing painted surfaces altered, defaced or damaged as a result of work of this project. Surface treatment, priming and coats of paint specified in this section are in addition to shop priming and surface treatment specified under other sections. Number of coats specified are minimum; uniform coverage is required, free from defects or blemishes.

C. Perform all painting work in any room in which finishing work is performed, including painting new surfaces as specified and re-painting all existing surfaces within the room, one coat same as last coat specified for similar work.

D. All existing surfaces with any paint, stain, varnish or similar type coating shall be assumed to contain various concentrations of lead. Cal/OSHA regulations are therefore applicable during disturbance, preparation or repainting of any such surfaces.

E. Related Requirements:

1. Section 05 10 00, Structural Steel for shop priming of metal substrates with primers specified in this Section.
2. Section 09 91 23, Interior Painting for surface preparation and the application of paint systems on interior substrates.
3. Section 09 93 00, Staining and Transparent Finishing for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.
4. Section 09 96 00, High-Performance Coatings for special-use coatings.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees,

according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 35 units at 85 degrees, according to ASTM D 523

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

H. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA.

I. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.

J. RAVOC: Reactivity adjusted VOC 'Reactivity' means the ability of a VOC to promote ozone formation.

K. PDCA: Painting & Decorating Contractors of America www.pdca.org

L. SSPC: Scopes of SSPC Surface Preparation Standards and Specifications. www.sspc.org.

M. Green Wise: Green Wise products are tested in an ISO accredited laboratory to meet environmentally determined performance standards established by Coatings Research Group, Inc.

N. Dunn-Edwards Conformance Chart: DE CONFORMANCE TABLE

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of

topcoat.

1. Submit Samples on rigid backing, no smaller than 7 inches by 10 inches (177.8 mm by 254 mm) or larger than 8.5 inches by 11 inches (215.9 mm by 279.4 mm).
2. Label each Sample for project, architect, general contractor, painting contractor, paint color name and number, paint brand name, "P" number if applicable, and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: Provide not less than 2 gal. (7.6 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
   b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the
completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F (7 degrees C) or more than 120 degrees F (49 degrees C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 90 degrees F (10 and 32 degrees C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.

C. Painting contractor should follow proper painting practices and exercise judgment based on his or her experience and project specific conditions as to when to proceed.

1.9 WORK NOT TO BE PAINTED (Unless specifically shown otherwise)

A. Exterior concrete and all concrete slab surfaces, except exposed interior slabs as noted on schedules.

B. Masonry.

C. Suspended acoustical ceilings and acoustical tile, except as noted on finish schedules.

D. Pre-finished casework.

E. Finish hardware (except prime coated).

F. Normally non-painted items as follows: Glass, ceramic tile, built-up roofing, safety nosings, resilient floor covering and base, carpet, pre-finished paneling, plastic laminate, porcelain enamel, vinyl wallcovering.

G. Aluminum doors, windows, frames and railings.

H. Metal or plastic toilet partitions and other factory finished items.

I. Items of chromium, copper, nickel, brass, bronze or stainless steel.

J. Surfaces in concealed areas such as furred spaces.

K. Existing rooms or areas not affected by work of this project, unless specifically noted otherwise.

L. Tops of gravel stop flanges including priming.

M. Wall areas concealed by cases, counters, cabinets, chalkboards, tackboards (prime coat only required).

N. Piping or conduit including brackets, etc., therewith running on or across unpainted or otherwise unfinished walls or ceilings (paint exposed items).

O. Galvanized gratings, recessed foot grilles and thresholds.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Paint Coatings Basis-of-Design: Dunn-Edwards Corporation or approved equal.

B. Anti-Graffiti Coatings Basis of Design: TSW, Inc., Gaffiti Master Products, Sacramento CA 95823

1. Product: TSW8 Acryli-Master, clear matte sheen, water-based acrylic, non-sacrificial, graffiti-resistant coating or approved equal.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

C. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited.

D. Colors: As selected by the Architect.

1. Indicate a percentage of the surface area that will be painted with deep tones.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will comply with requirements to use compatible products and systems as described in Paragraph 2.2.A. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Portland Cement Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured, including pH testing to determine that alkalinity is within limits established by the manufacturer.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

G. Shop Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

H. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2. Sand surfaces that will be exposed to view and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. The number of coats scheduled is the minimum number of coats required. Additional coat(s) shall be applied at no additional cost to the Owner, to completely hide base material, provide uniform color, and to produce satisfactory finish results.
3. Apply coatings without thinning except as specifically required by label directions or required by these specifications. In such cases, thinning shall be the minimum reduction permitted.
4. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
5. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
6. Paint entire exposed surface of window frames and sashes.
7. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
8. Priming may not be required on items delivered with prime or shop coats, unless otherwise specified. Touch up prime coats applied by others as required ensuring an even primed surface before applying finish coat.

B. Tint each undercoat to a lighter shade of the finish coat (not to exceed 2 ounces of colorant) to facilitate identification of each coat if multiple coats of same material are to be applied.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Block Fillers: Provide block fill as scheduled to conform to the following: PDCA Standard P12-05.

1. Level 3 - Premium fill: One or multiple coats of high performance block filler manufactured to be applied at a high dry film build. Block filler shall be back-rolled to eliminate voids and reduce the majority of the masonry profile depth.

F. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:
   a. Equipment, including panelboards and switch gear.
   b. Uninsulated metal piping.
   c. Uninsulated plastic piping.
   d. Pipe hangers and supports.
   e. Metal conduit.
   f. Plastic conduit.
   g. Tanks that do not have factory-applied final finishes.
   h. Other items as directed by the Architect.

G. Anti-Graffiti Coating: Apply in strict conformance to manufacturer's recommended application instructions. Prepare existing surface prior to application per manufacturer's instructions and apply at coverage and dilution rate and number of coats as required by the product manufacturer.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Non-Traffic Surfaces:

1. Premium Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Select ESSL00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% acrylic, (Gloss Level 6).

B. Clay-Masonry, CMU (without block filler) Substrates:

1. Premium Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior Dunn-Edwards, Eff-Stop Select ESSL00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% ac

rylic, (Gloss Level 6).

C. CMU Substrates:

1. Premium Latex System:

a. Prime Coat: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth BLOCFIL Select SBSL00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth BLOCFIL Premium SBPR00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% ac

rylic, (Gloss Level 6).

D. Steel Substrates:

1. Premium Latex over a Waterborne Alkyd Primer System:

   a. Prime Coat: Primer, rust inhibitive, waterborne alkyd, interior/exterior, Dunn-Edwards, Bloc-Rust Premium BRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
   b. Intermediate Coat: Latex, exterior, matching topcoat.
   c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
      Or
   d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
      Or
   e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
      Or
   f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
      Or
   g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
      Or
   h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex over a Waterborne Alkyd Primer System:

   a. Prime Coat: Primer, rust inhibitive, waterborne alkyd, interior/exterior, Dunn-Edwards, Bloc-Rust Premium BRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
   b. Intermediate Coat: Latex, exterior, matching topcoat.
   c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
      Or
   d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
      Or
   e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
      Or
   f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).
      Or

g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% acrylic, (Gloss Level 6).

3. Waterborne Urethane Alkyd Enamel System:

a. Prime Coat: Primer, rust inhibitive, waterborne alkyd, interior/exterior, Dunn-Edwards, Bloc-Rust Premium BRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
b. Intermediate Coat: Waterborne urethane alkyd, interior/exterior matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5)
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

E. Galvanized Metal Substrates:

1. Premium Latex System:
a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00**.**
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00**.**
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% acrylic, (Gloss Level 6).

3. Waterborne Urethane Alkyd Enamel over a Latex Primer System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Waterborne urethane alkyd, interior/exterior, matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards Aristoshield ASHL50, (Gloss Level 5)
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards Aristoshield ASHL70, (Gloss Level 7).

F. Aluminum Substrates:

1. Premium Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or

d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00**.**
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% acrylic, (Gloss Level 6).

3. Waterborne Urethane Alkyd Enamel over a Latex Primer System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Waterborne urethane alkyd, interior/exterior, matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-

Edwards, Aristoshield ASHL50, (Gloss Level 5)
Or

e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

G. Wood Substrates:

1. Premium Latex System:

a. Prime Coat: Primer, waterbased, exterior, Dunn-Edwards, EZ-Prime Premium EZPR00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Primer, waterbased, exterior, Dunn-Edwards, EZ-Prime Premium EZPR00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).

Or

g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% acrylic, (Gloss Level 6).

H. Portland Cement Plaster (Stucco) Substrates:

1. Premium Latex over Alkali Resistant Primer System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Select ESSL00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield, SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 100% acrylic (Gloss Level 4).

Or

g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% acrylic, (Gloss Level 6).

I. Exterior Gypsum Board Substrates:

1. Premium Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultra-Grip Select UGSL00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Spartashield SSHL10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Spartashield SSHL20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Spartashield SSHL30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Spartashield SSHL40 100% acrylic (Gloss Level 4).
Or
g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield SSHL50 100% acrylic, (Gloss Level 5).
Or
h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Spartashield SSHL60 100% acrylic, (Gloss Level 6).

2. Ultra-Premium Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultra-Grip Premium UGPR00.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat, Dunn-Edwards, Evershield EVSH10 100% acrylic, (Gloss Level 1).
Or
d. Topcoat: Latex, exterior, velvet, Dunn-Edwards, Evershield EVSH20 100% acrylic, (Gloss Level 2).
Or
e. Topcoat: Latex, exterior, eggshell, Dunn-Edwards, Evershield EVSH30 100% acrylic, (Gloss Level 3).
Or
f. Topcoat: Latex, exterior, low sheen, Dunn-Edwards, Evershield EVSH40 10

0% acrylic (Gloss Level 4).
Or

g. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Evershield EVSH50 100% acrylic, (Gloss Level 5).
Or

h. Topcoat: Latex, exterior, gloss, Dunn-Edwards, Evershield EVSH60 100% acrylic, (Gloss Level 6).

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates listed in 3.6 Interior Painting Schedule.

B. Paint, stain or otherwise finish all new surfaces. Paint all existing surfaces as indicated or scheduled on drawings. Work includes back priming of concealed surfaces, except as otherwise specified; and paint, repaint or finish any existing painted surfaces altered, defaced or damaged as a result of work of this project. Surface treatment, priming and coats of paint specified in this section are in addition to shop priming and surface treatment specified under other sections. Number of coats specified are minimum; uniform coverage is required, free from defects or blemishes.

Perform all painting work in any room in which finishing work is performed, including painting new surfaces as specified and re-painting all existing surfaces within the room, one coat same as last coat specified for similar work.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 1 to 2 units at 85 degrees.

B. Gloss Level 2: 5 to 9 units at 60 degrees and 10 to 15 units at 85 degrees.

C. Gloss Level 3: 10 to 15 units at 60 degrees and 15 to 30 units at 85 degrees.

D. Gloss Level 4: 20 to 35 units at 60 degrees and 35 to 50 units at 85 degrees.

E. Gloss Level 5: 40 to 50 units at 60 degrees.

F. Gloss Level 6: 70 to 80 units at 60 degrees.

G. Gloss Level 7: More than 80 units at 60 degrees.

H. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.

I. Mildew Resistant: Certified products are specially formulated with microbicidal additives that resist mold, mildew, and algae growth on the paint film and inhibit growth of bacterial odors.

J. CHPS: Collaborative for High Performance Schools. A national movement to improve student performance and the entire educational experience by building the best possible schools. www.chps.net.

K. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA.

L. PDCA: Painting & Decorating Contractors of America www.pdca.org .

M. RAVOC: Reactivity adjusted VOC. "Reactivity" means the ability of a VOC to promote ozone formation

N. SSPC: The Society for Protective Coatings publishes Scopes of SSPC Surface Preparation Standards and Specifications www.sspc.org .

O. Dunn-Edwards Conformance Chart: D-E CONFORMANCE TABLE

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. LEED v.4 Requirements: Interior paints and coatings must pass CDPH Standard Method V1.1 (also called section 01350) emissions testing; and they must comply with the VOC content limits of the California ARB 2007 Suggested Control Measure for Architectural Coatings.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, no smaller than 7 inches X 10 inches (177 mm X 254 mm) or larger than 8.5 inches X 11 inches (216 mm X 280 mm).
2. Label each Sample for project, architect, general contractor, painting contractor, paint color name and number, paint brand name, "P" number if applicable, and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: Provide not less than 2 gal. (7.6 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 90 degrees F (10 and 32 degrees C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.

C. Painting contractor should follow proper painting practices and exercise judgment based on his or her experience and project specific conditions as to when to proceed.

1.9 WORK NOT TO BE PAINTED (Unless specifically shown otherwise)

A. Exterior concrete and all concrete slab surfaces, except exposed interior slabs as noted on schedules.

B. Masonry.

C. Suspended acoustical ceilings and acoustical tile, except as noted on finish schedules.

D. Pre-finished casework.

E. Finish hardware (except prime coated).

F. Normally non-painted items as follows: Glass, ceramic tile, built-up roofing, safety nosings, resilient floor covering and base, carpet, pre-finished paneling, plastic laminate, porcelain enamel, vinyl wallcovering.

G. Aluminum doors, windows, frames and railings.

H. Metal or plastic toilet partitions and other factory finished items.

I. Items of chromium, copper, nickel, brass, bronze or stainless steel.

J. Surfaces in concealed areas such as furred spaces.

K. Existing rooms or areas not affected by work of this project, unless specifically noted otherwise.

L. Tops of gravel stop flanges including priming.

M. Wall areas concealed by cases, counters, cabinets, chalkboards, tackboards (prime coat only required).

N. Piping or conduit including brackets, etc., therewith running on or across unpainted or otherwise unfinished walls or ceilings (paint exposed items).

O. Galvanized gratings, recessed foot grilles and thresholds.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Dunn-Edwards Corporation or approved equal.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Provide material that comply with VOC limits of authorities having jurisdiction.

C. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited and zero VOC colorants should be used whenever possible.

D. Colors: As selected by the Architect.

1. Indicate a percentage of surface area which will be painted with deep tones.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will comply with requirements to use compatible products and systems as described in Article 2.2. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured, including pH testing to determine that alkalinity is within limits established by the manufacturer.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions, including pH testing to determine that alkalinity is within limits established by the manufacturer.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

G. Shop Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

H. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat to a lighter shade of the finish coat (not to exceed 2 ounces of colorant) to facilitate identification of each coat if multiple coats of same material are to be applied.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Block Fillers: Provide block fill as scheduled to conform to the following PDCA Standard P12-05:

1. Level 3 - Premium Fill: One or multiple coats of high performance block filler manufactured to be applied at a high dry film build. Block filler shall be back-rolled to eliminate voids and reduce the majority of the masonry profile depth.

F. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

    a. Equipment, including panelboards and switch gear.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Tanks that do not have factory-applied final finishes.
    h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    i. Other items as directed by the architect.

2. Paint the following work where exposed in occupied spaces:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.

g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by the Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Premium Low Odor /VOC Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Select ESSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).

Or

d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Ultra-Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer sealer, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Everest EVER50, (Gloss Level 5).

3. Waterborne Urethane Alkyd Enamel over a Latex Primer System:

a. Prime Coat: Primer, alkali resistant, waterbased, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Waterborne urethane alkyd, interior/exterior, matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

4. Pre-Catalyzed Waterbased Epoxy Over a Latex Primer System:

a. Prime Coat: Primer, alkali resistant, waterbased, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy, interior, matching topcoat.
c. Topcoat: Pre-catalyzed waterbased epoxy, interior, semi-gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

B. Clay-Masonry Substrates:

1. Premium Low Odor /VOC Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, Dunn-Edwards, Eff-Stop Select ESSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Ultra-Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Latex, interior, low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Everest EVER50, (Gloss Level 5).

3. Waterborne Urethane Alkyd Enamel over a Latex Primer System:

a. Prime Coat: Prime Coat: Primer, alkali resistant, waterbased, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Waterborne urethane alkyd matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

4. Pre-Catalyzed Waterbased Epoxy Over a Latex Primer System:

a. Prime Coat: Primer, alkali resistant, water based, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy matching topcoat.
c. Topcoat: Pre-catalyzed waterbased epoxy, interior, semi-Gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

C. CMU Substrates:

1. Premium Low Odor/VOC Latex System:

a. Block Filler: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth Blocfil Select SBSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Ultra-Premium Low Odor/VOC Latex System:

a. Block Filler: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth Blocfil Premium SBPR00.
b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, flat, Dunn-Edwards, Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low odor/VOC, semi-gloss, Dunn-Edwards, Everest EVER50, (Gloss Level 5).

3. Waterborne Urethane Alkyd Enamel over a Latex Block Filler System:

a. Block Filler: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth Blocfil Select SBSL00.
b. Intermediate Coat: Waterborne urethane alkyd, interior/exterior, matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

4. Pre-Catalyzed Waterbased Epoxy over a Latex Block Filler System:

a. Block Filler: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth Blocfil Select SBSL00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy, interior, matching topcoat.
c. Topcoat: Pre-catalyzed waterbased epoxy, interior, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

D. Steel Substrates:

1. Premium Low Odor/VOC Latex over a Waterborne Alkyd Primer System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, Dunn-Edwards, Bloc-Rust Premium BRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).
Or

d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Water Based Dry Fall System:

a. Topcoat: Dry fall, water based, flat, Dunn-Edwards, Aquafall AQUA10, (Gloss Level 1).
Or
b. Topcoat: Dry fall, water based, eggshell, Dunn-Edwards, Aquafall AQUA30, (Gloss Level 3).
Or
c. Topcoat: Dry fall, water based, semi-gloss, Dunn-Edwards, Aquafall AQUA50, (Gloss Level 5).

3. Ultra-Premium Low Odor/VOC Latex over a Waterborne Alkyd Primer System:

a. Prime Coat: Primer, rust-inhibitive, water based, Dunn-Edwards, Bloc-Rust Premium BRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
b. Intermediate Coat: Latex, interior, low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, low odor/VOC, flat, Dunn-Edwards Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, low odor/VOC, velvet, Dunn-Edwards Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, low odor/VOC, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low odor/VOC, semi-gloss, Dunn-Edwards, Everest EVER50, (Gloss Level 5).

4. Waterborne Urethane Alkyd Enamel System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, Dunn-Edwards, Bloc-Rust Premium BRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
b. Intermediate Coat: Waterborne urethane alkyd matching topcoat.

c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

5. Pre-Catalyzed Waterbased Epoxy over a Waterborne Alkyd Primer System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, Dunn-Edwards, Bloc-Rust Premium BRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy matching topcoat.
c. Topcoat: Pre-catalyzed waterbased epoxy, interior, semi-gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

E. Galvanized Metal Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, water based, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Water Based Latex Dry Fall System:

Topcoat: Dry fall, water based, flat, Dunn-Edwards, Aquafall AQUA10, (Gloss Level 1).
Or
a. Topcoat: Dry fall, water based, low sheen, Dunn-Edwards, Aquafall AQUA30, (Gloss Level 3).

Or

b. Topcoat: Dry fall, water based, low sheen, Dunn-Edwards, Aquafall AQUA50, (Gloss Level 4).

3. Ultra-Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, waterbased, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Latex, interior, low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, low odor/VOC, flat, Dunn-Edwards Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, low odor/VOC, velvet, Dunn-Edwards Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, low odor/VOC, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low odor/VOC, semi-gloss, Dunn-Edwards, Everest, EVER50, (Gloss Level 5).

4. Waterborne Urethane Alkyd Enamel over a Latex Primer System:

a. Prime Coat: Primer, waterbased, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Waterborne urethane alkyd matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

5. Pre-Catalyzed Waterbased Epoxy Over a Latex Primer System:

a. Prime Coat: Primer, waterbased, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy matching topcoat.
c. Topcoat: Pre-catalyzed waterbased epoxy, interior, semi-gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

F. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, waterbased, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Ultra-Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, waterbased, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Everest, EVER50, (Gloss Level 5).

3. Waterborne Urethane Alkyd Enamel over a Latex Primer System:

a. Prime Coat: Primer, waterbased, Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00.
b. Intermediate Coat: Waterborne urethane alkyd matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or

e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

4. Pre-Catalyzed Waterbased Epoxy over a Latex Primer System:

a. Prime Coat: Primer, water based, Dunn-Edwards, Ultrashield Premium ULGM00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy matching topcoat.
c. Topcoat: Waterbased epoxy, interior, semi-gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5)"Aluminum Paint System" Subparagraph below corresponds to MPI INT 5.4D.

G. Wood Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, latex, for interior wood, Dunn-Edwards, Inter-Kote IKPR00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Ultra-Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, latex, for interior wood, Dunn-Edwards, Inter-Kote IKPR00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).

Or

f. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Everest EVER50, (Gloss Level 5).

3. Waterborne Urethane Alkyd Enamel over a Latex Primer System:

a. Prime Coat: Primer, latex, for interior wood, Dunn-Edwards, Inter-Kote IKPR00.
b. Intermediate Coat: Waterborne urethane alkyd matching topcoat.
c. Topcoat: Waterborne urethane alkyd enamel, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

4. Pre-Catalyzed Waterbased Epoxy:

a. Prime Coat: Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultra-Grip Premium UGPR00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy matching topcoat.
c. Topcoat: Waterbased epoxy, interior, semi-gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

H. Gypsum Board Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer sealer, latex, interior, Dunn-Edwards, Vinylastic Select VNSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40, (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50, (Gloss Level 5).

2. Ultra-Premium Low-Odor/VOC Latex System:

    a. Prime Coat: Primer sealer, latex, interior, Dunn-Edwards, Vinylastic Premium VNPR00.
    b. Intermediate Coat: Latex, interior, low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, low odor/VOC, flat, Dunn-Edwards Everest EVER10, (GlossLevel 1)
    Or
    d. Topcoat: Latex, interior, low odor/VOC, velvet, Dunn-Edwards Everest EVER20, (Gloss Level 2).
    Or
    e. Topcoat: Latex, interior, low odor/VOC, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
    Or
    f. Topcoat: Latex, interior, low odor/VOC, semi-gloss, Dunn-Edwards, Everest EVER50, (Gloss Level 5).

3. Waterborne Urethane Alkyd Enamel over Latex Sealer System:

    a. Prime Coat: Primer sealer, latex, interior, Dunn-Edwards, Vinylastic Premium VNPR00.
    b. Intermediate Coat: Waterborne urethane alkyd matching topcoat.
    c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards Aristoshield ASHL30, (Gloss Level 3).
    Or
    d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards Aristoshield ASHL50, (Gloss Level 5)
    Or
    e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards Aristoshield ASHL70, (Gloss Level 7)

4. Pre-Catalyzed Waterbased Epoxy:

    a. Prime Coat: Primer sealer, latex, interior, Dunn-Edwards, Vinylastic Premium VNPR00.
    b. Intermediate Coat: Pre-catalyzed waterbased epoxy matching topcoat.
    c. Topcoat: Waterbased epoxy, interior, semi-gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

I. Plaster Substrates:

1. Premium Low Odor/VOC Latex System:

    a. Prime Coat: Primer, alkali resistant, water based, Dunn-Edwards, Eff-Stop Select ESSL00.
    b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10 (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards, Spartawall SWLL20 (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30 (Gloss Level 3).
Or
f. Topcoat: Latex, interior, low sheen, Dunn-Edwards, Spartawall SWLL40 (Gloss Level 4).
Or
g. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall SWLL50 (Gloss Level 5).

2. Ultra-Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, alkali resistant, water based, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards Everest EVER10, (Gloss Level 1).
Or
d. Topcoat: Latex, interior, velvet, Dunn-Edwards Everest EVER20, (Gloss Level 2).
Or
e. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Everest EVER30, (Gloss Level 3).
Or
f. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Everest EVER50, (Gloss Level 5).

3. Waterborne Urethane Alkyd Enamel over Latex Primer System:

a. Prime Coat: Primer, alkali resistant, waterbased, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Waterborne urethane alkyd matching topcoat.
c. Topcoat: Waterborne urethane alkyd, interior/exterior, eggshell, Dunn-Edwards, Aristoshield ASHL30, (Gloss Level 3).
Or
d. Topcoat: Waterborne urethane alkyd, interior/exterior, semi-gloss, Dunn-Edwards, Aristoshield ASHL50, (Gloss Level 5).
Or
e. Topcoat: Waterborne urethane alkyd, interior/exterior, high gloss, Dunn-Edwards, Aristoshield ASHL70, (Gloss Level 7).

4. Pre-Catalyzed Waterbased Epoxy over a Latex Primer System:

a. Prime Coat: Primer, alkali resistant, waterbased, Dunn-Edwards, Eff-Stop Premium ESPR00.
b. Intermediate Coat: Pre-catalyzed waterbased epoxy matching topcoat.
c. Topcoat: Pre-catalyzed waterbased epoxy, interior, semi-gloss, Dunn-Edwards, Enduracat ENPX50, (Gloss Level 5).

END OF SECTION

CHALKBOARDS, DRY MARKER BOARDS AND TACKBOARDS

Section 10 10 00
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry, for wood blocking.

B. Section 09 29 00, Gypsum Wallboard.

D. Section 09 72 00, FRP Wall Covering.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

1.04 SUBMITTALS

A. Refer to Section 01 30 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: The following samples are required. Submit per Section 01 30 00.

1. Submit sample for each type of board and trim components to Architect for review.

2. Manufacturer's full range of colors for Architect's selection.

D. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Include in-wall blocking requirements.

E. Submit executed Guarantee of Contractor/Subcontractor per Article 1.06.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 30 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.05.

C. Guarantee shall be for two (2) years minimum and shall cover operation of sliding units and warrant against warping of sliding panel units.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Porcelain Enamel Steel Chalkboards: Nelson Adams Co., "NACO Steel"; or approved equal. Face sheet 24 ga enameling steel, with writing surface of porcelain over ground coated face sheet in accord with Specifications for Porcelain Enamel Chalkboards, S-104, of Porcelain Enamel Institute; 7/16" plywood core; backing sheet aluminum foil; bond all three plies under high pressure to produce 1/2" nominal chalkboards. Colors as selected by Architect from manufacturer's standard palette of at least 7 colors.

1. Painted Coordinates: Where indicated on drawings provide chalkboards with precisely enameled Cartesion coordinates in colors selected by Architect.

B. Dry Marker Boards (DMB) shall be Greensteel "AL" series prefab markerboards, factory laminated and framed as detailed. Facing sheet shall be 26 ga., laminated to 7/16" fiberboard with .005" aluminum backing sheet bonded with special flexible adhesive. Colors as selected by Architect from manufacturer's standard palette.

C. Frame and Trim (DMB and Chalkboards): Metal Trim shall be by same manufacturer as DMB. Extruded aluminum trim 6063 - T5 alloy with etched anodized satin finish. Joints shall have tight smooth fit. Dividers shall be factory finished to match chalkboard or DMB color and texture. Trim shall be the following.

1. Metal frame: Narrow trim "thin" profile, all exposed edges.

2. Chalkrail: 52T with end plates, typical. Ends of chalkrails shall be rounded and ground smooth.

3. Maprail, with cork insert: 253T, full length over chalkboards and furnished with one 1002T combination hook and clip for each 24" length of maprail and two #4500T flag holders for each chalkboard. Provide end stops.

4. Divider: #D-1 in color to match chalkboard or DMB.

5. Metal trim between chalk and tackboard: #F-1B in color to match chalkboard.

D. Horizontal Sliding Units: Greensteel Top Hung Horizonal Sliding Panel Unit, Manually Operated F Series or approved equal.

1. Frame: Frame and exposed metal members to be of 6063-T5 alloy, anodized satin finish, aluminum extrusions, 684 TR.

2. Chalk Tray: 675 T with exposed corners mitered and ground smooth.

3. Map Rail: 2" high map rail and 685 T removable fascia with one combination hook/clip for each 24" of length and two flag holders.

4. Hardware: Rolling hardware to be nylon tipped, ball bearing rollers of sufficient size and number to enable smooth and easy operation of panels.

5. Panel finish:

a. Sliding panel units to be DMB.

b. Back fixed panel to be DMB.

6. Size: Typical units unless indicated otherwise shall be 16'-3" w x 4'-0" h, 3 panels.

7. Pulls: 3" finger pull at each jamb (1 per sliding unit).

E. Tackboards:

1. As a standard of quality, tackboards shall be equal to NACO fine grain sheet bulletin board cork with burlap back reinforcing; 1/4 inch thick with a flamespread rating of 25 and smoke density of 450.

2. Vinyl covering: Provide vinyl wall covering material to match walls as selected by the Architect. See Section 09 20 50 for acceptable manufacturers.

3. Completely bond cork to 1/4 inch plywood or hardboard backing, using adhesive as recommended by cork manufacturer; apply with burlap side to backing.

2.02 FABRICATION

A. Chalkboards and Dry Marker Boards to 16 feet in length shall be in one piece without splices.

B. Dry Marker Boards in Sliding Units shall not exceed 5'-6" in width.

C. Tackboards shall be factory fabricated to sizes shown on Drawings.

D. All perimeter edges shall be trimmed with continuous moldings as specified for each location.

1. Moldings shall be installed with minimum splices. Butt splices neatly with hairline joint

and center on a divider molding.

2. Miter corners; form neat, hairline joint.

3. Secure vertical edge moldings to chalkboards and tackboards from back side so that screws are concealed when board is installed. Use flat head wood screws, with heads countersunk into molding.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accord with the approved designs.

C. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 INSTALLATION

A. Install items where indicated on the Drawings, in full accord with all reviewed shop drawings and the manufacturer's recommendations, anchoring all components firmly in place for long life under hard use.

B. Secure chalkboards, dry marker boards and tackboards to solid backing by attaching with oval head screws of sufficient length to penetrate wood framing not less than 1-1/2 inch and as required to provide firm anchorage into metal framing.

C. Keep perimeter lines straight, plumb and level. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim and accessories necessary for a complete installation.

D. Coordinate job-site assembled units with grounds, trim and accessories. Joint all parts with neat, precision fit.

E. Coordinate installation of sliding units with casework construction. Sliding units shall operate smoothly and easily without binding, scraping or drag.

3.03 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

END OF SECTION

CHALKBOARDS, DRY MARKER BOARDS AND TACKBOARDS

Section 10 10 00
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 00 00, Misc. Concrete, for post footings.

B. Section 08 11 13, Hollow Metal Doors and Frames.

C. Section 09 91 13 and 09 91 23, Exterior Painting and Interior Painting.

1.03 QUALITY ASSURANCE

A. Use only new materials and products unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

1.04 SUBMITTALS

A. Refer to Section 01 30 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: The following samples are required. Submit per Section 01300.

1. Submit sample for each type of material and letter font to Architect for review.

2. Manufacturer's full range of colors for Architect's selection.

D. Shop Drawings: Show all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Include dimensioned layout and installation details for field installation.

1.05 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, 2019 California Building Code.

B. Title 19, CCR, Article 33.01(i).

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.07 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 – PRODUCTS
(NOTE: Not all sign types may be used. See drawings for sign types and locations)

2.01 PLASTIC SIGNS

A. General (unless otherwise noted): 1/8" thick minimum acrylic; subsurface applied 3M (or approved equal) vinyl graphics and subsurface applied paint.
NOTE: All signage shall comply with requirements of 2019 CBC 11B-703

1. Raised Characters and Lettering
    i. Raised characters and Lettering: Symbols and letters shall be raised above subsurface a minimum 1/32".
    ii. Case: Characters and letters shall be uppercase.
    iii. Style: Characters and letters shall not be italic, oblique, script, highly decorative or of other unusual forms.
    iv. Character proportions: Character shall be proportioned where the width of the uppercase letter “O” is 60 percent minimum and 110 percent maximum of the height of uppercase letter “I”.
    v. Height: Lettering shall be 1 inch high minimum and 2 inch high maximum on the height of an uppercase “I” with 15% stroke width of the uppercase letter “I”.
    vi. Character spacing shall be measured between the two closest points of adjacent raised characters, 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 sections, and 1/8” 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
    vii. 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.
    viii. Symbols where specified shall be international style.
2. Braille: Braille shall be contracted (Grade 2) Braille
    i. Raised characters and letters shall be duplicated with contracted Grade 2 Braille at **all** locations, except occupancy sign locations.

ii. Braille dots shall have a domed or rounded shape and shall have the following spacing:
- Dot base diameter: 0.059 (1.5 mm) to 0.063 (1.6 mm)
- Distance between dots in the same cell: 0.100 (2.5 mm)
- Distance between corresponding dots in adjacent cells: 0.300 (7.6 mm)
- Dot height: 0.025 (0.6 mm) to 0.037 (0.9 mm)
- Distance between corresponding dots from one cell directly below: 0.395 (10 mm) to 0.400 (10.2 mm)

iii. Position: Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be positioned below the entire text. Braille shall be separated 3/8 inch (9.5 mm) minimum and ½ inch (12.7 mm) maximum from any other tactile characters and 3/8 inch (9.5 mm) minimum from raised borders and decorative elements.

1. Occupancy Signs (capacity sign): Capacity to be as indicated on plans or as provided by Architect; sign to read as follows:

   a. Maximum Number - General: “The number of people permitted in this room shall not exceed _____ by order of the Division of State Architect/Office of Regulation Services”.

   b. At Rooms Used for Assembly and Dining: “The number of people permitted in this room shall not exceed _____ Assembly _____ Dining by order of the Division of State Architect/Office of Regulation Services”.

   c. At Rooms with Operable or Folding Partitions: “While partition is in the open position the number of people permitted in this room shall not exceed _____ by order of the Division of State Architect/Office of Regulation Services”.

2. Toilet Room Signs: At all toilet rooms provide one (signs a. - e.) of the following at each entry door. (Specific usage of each sign type to be verified at time of shop drawing submittal.)

   a. Girls: 12 inch diameter circle, 1/8 inch thick with eased edges; International symbol for girls with the word "GIRLS" below symbol.

   b. Boys: Equilateral triangle with sides 12 inches long, 1/8 inch thick with eased edges; International symbol for boys with the word "BOYS" below symbol.

   c. Women: 12 inch diameter circle, 1/8 inch thick with eased edges; International symbol for women with the word "WOMEN" below symbol.

   d. Men: Equilateral triangle with sides 12 inches long, 1/8 inch thick with eased edges; International symbol for men with the word "MEN" below symbol.

   e. Unisex: Equilateral triangle with sides 12 inches long on 12 inches diameter circle, both 1/8 inch thick, both with eased edges. International symbol for unisex restroom.

   f. All restrooms: In addition to the signs listed above, provide at every door a 14" wide, 7" high rectangle, 1/8" thick with eased edges; 6" high international wheelchair symbol. 1" raised lettering, specifying the room name to the left of the symbol with contracted Grade #2 Braille translation below.

g. Geometric symbols shall have their color and contrast distinctly different from the color and contrast of the door.

3. Exit Signs:

   a. General: Signs to be listed by UL for their appropriate use.

   b. All rooms exiting from building to outside shall be provided with a tactile exit sign. Signs shall be 125" thick "Westinghouse Micarta" high pressure laminate. Background shall be sandblasted away leaving integral raised letters and Braille. Paint entire front surface of sign. With the exception of Braille, and unless otherwise noted, all raised typography and symbols shall be colored by the silkscreening process. Braille shall remain the same color as the sign background color.

   c. Exit Signs: Model 2040-01 or 07 by Isolite Corp.; self-luminous sign for wall or ceiling mount, as indicated and as required by CBC. Text and arrows in green color; aluminum surround of dark anodized finish; double sided where indicated with matching perimeter frame.

   d. Low-Level Exit Signs: Model 13 by Active Safety; photoluminescent sign for wall mount beside door or on door as indicated and as required by CBC. Text in luminescent color; aluminum surround of dark bronze anodized finish. Must be listed pursuant to UL 924.

4. Room Identification Signs: Provide at each classroom and other areas as noted on the Door Schedule or drawings.

   a. .125" thick "Westinghouse Micarta" high pressure laminate. Background shall be sandblasted away leaving integral raised letters and Braille. Paint entire front surface of sign. With the exception of Braille, and unless otherwise noted, all raised typography and symbols shall be colored by the silkscreening process. Braille shall remain the same color as the sign background color.

   b. Provide name and room number at each door indicated. Names and numbers to be reviewed and approved by Architect and School District prior to fabrication. Allow 4 numbers and 14 letters for each sign.

   c. Sign to be as detailed on drawings and installed as directed on, or adjacent to, doors.

5. Chemical Storage Sign: As shown.

6. Area for Rescue Assistance Sign: To read "Area of rescue assistance" with international symbol of accessibility.

7. Assistive Listening Device Sign: To read “LISTENING DEVICE AVAILABLE” with international symbol of access for hearing impaired.

8. Emergency Elevator Sign: Sign as approved by the State Fire Marshal to read: "In case of fire do not use elevator, use exit stairs".

9. Not an Exit Sign: To read "This is not an exit".

10. Warning Signs: Provide at roof access ladder to roof with Science Laboratory fume hood exhaust fans (Unit B). Signs to read: "Toxic fumes are present on roof. Turn off circuit breakers to fume hood fans before accessing roof".

11. Gasline Identification Sign: "Caution: Gas pipe concealed in wall".

12. Floor Live Load Capacity Sign: To read "125 psf maximum live load design for stage floor".

13. Ceiling Live Load Capacity Sign: To read "50 psf maximum live load design for stage ceiling".

B. All signage to comply with the Americans with Disabilities Act Standards and requirements.

2.02 METAL SIGNS

A. Metal Reflectorized Signs: Porcelain on steel with beaded text.

1. Accessible parking stalls: 70 square inches minimum in size. International symbol of accessibility in white against dark blue background, no text.

2. Van Accessible: Same as Handicapped Parking Sign with "Van Accessible" below the symbol. Mount at 6'-8" minimum above finish grade.

3. Stop sign: Standard 18" min. hexagonal shape, red & white, post mounted to meet City standards.

B. Metal Painted Signs: Baked enamel on steel.

1. Parking Lot Entrances: 17 inches wide x 22 inches high, with 1 inch high letters on dark blue background. Sign is to read:

"Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or license plates issued for persons with disabilities may be towed away at owner's expense. Towed vehicles may be reclaimed at **[**_____ * _____**]** by telephoning **[**_____ * _____**]**.

Blank spaces are to be filled in with appropriate information as a permanent part of the sign. Contact owner for name and phone number of towing service.

2. Traffic Control: Signs shall comply with State of California, Business, Transporation and Housing Agency, Department of Transportation 1990 Uniform Sign Chart.

3. Gate Sign: Provide sign in all caps at entry gate(s) as described in drawings.

2.03 LOW LEVEL PATHWAY MARKINGS

A. Acceptable Products: Low Level Signage Systems by Active Safety or approved equal.

B. Low Level Pathway: Series 11.000 Polystyrene (11.000 PSC) Aluminum (11.000 LA) System, 1□" wide aluminum J-mold track with green self-illuminating pathway, non-electrical, non-radioactive, UL and CSFM listed.

C. Low Level Exit Marker Kick Plate: Series 18.000 Stainless Steel Kick Plate, 10" h x full width of door, green, self-illuminating letters, 1" stroke x 6" high, non-electrical, non-radioactive, UL and CSFM listed.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation, carefully inspect and verify that the installed work of other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 INSTALLATION OF SIGNS

A. Install signs in compliance with approved Shop Drawings.

B. Sign Mounting:

1. Surface mounted: Use minimum 4 recessed flush head tamper-proof screws per sign in addition to adhesive as recommended by manufacturer for given surface finish. Provide appropriate anchors in substrate as needed (such as expansion shields at masonry, etc.).

    a. Center on door laterally at 60 inches above finish floor.

    b. Install signs on wall adjacent to the latch side of the door. Where there is no wall space to the latch side, including double doors, locate at nearest adjacent wall.

    c. Locate such that a person may approach within 3 feet of signage without encountering protruding objects or standing within door swing path.

2. Post mounted: Galvanized steel carriage bolt with hex nut and washer. Touch up bolt head with paint to match background. Install post shown on drawings.

    a. Accessible Parking Stall Sign: Locate bottom of sign 6'-8" above paved surface. Center in front of stall. Provide one sign at each stall.

    b. Parking Lot Entry Sign: Locate bottom of sign 6'-8" above paved surface or 3’-0” above grade/turf. Locate per drawings.

    c. Stop Sign: Locate bottom of sign 6 ft. 8 in. above paved surface. Locate per drawings.

3. Posts: Size as shown; ASTM A-53, Grade B; Hot-dip process per ASTM A153.

C. Locations of all signs must be per approved Shop Drawings.

D. Other Signs: Install at location as directed by the Architect. Mounting method to be permanent, vandal resistant, approved by Architect.

3.03 PROTECTION

A. Protect work and materials of this Section and other Sections prior to and during installation, and protect the installed work and materials of all other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

3.04 ADJUSTING AND CLEANING

A. Remove all dust, dirt, fingermarks, etc. from signs and letters, as recommended by manufacturer.

END OF SECTION

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PLASTIC TOILET PARTITIONS

Section 10 17 00
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry, for blocking and backing.

B. Section 09 24 00, Cement Plaster.

C. Section 09 29 00, Gypsum Wallboard.

D. Section 10 28 00, Toilet Accessories.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

1.04 SUBMITTALS

A. Refer to Section 01 30 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Samples: The following samples are required. Submit per Section 01 30 00.

1. Submit sample for each type of panel and finish to Architect for review.

2. Manufacturer's full range of colors for Architect's selection.

D. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Include blocking layout for use in structural framing.

E. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Provide manufacturer's standard 15 year warranty, to include breakage, corrosion or delamination of installed plastic components, door latch and strike, integral hinge system and plastic shoes and wall brackets. Defective components shall be replaced. Labor for reinstallation included.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations to avoid deformation.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Floor Mounted, Overhead Braced type, HDPE Poly-blend system as manufactured by Hiny Hiders, as represented by Scranton Products, Phone (866) 753-4959, www.scrantonproducts.com or approved equal meeting requirements specified herein, modified as shown on the Drawings.

2.02 CONSTRUCTION

A. Panel, pilaster, and door material: Fabricated of HDPE Polymer resins under high pressure forming a monolithic component section which is waterproof, non-absorbent, and has a self-lubricating finish surface that resists marking with felt-tip and ball-point pens, pencils, and other writing instruments. Panels shall be flat and true with no warping, twisting or deformations acceptable.

1. Panel material shall comply with the following ASTM test standards and results:

Property	Value	Units	ASTM Method
Smoke Density	<75	13.9	D 2843
Self Ignition	650 F.	700 F.	D 1929-77
Rate Of Burn	2.0 cm/min.	1.29cm/min.	D635-81

B. Colors as selected by Architect from manufacturer's full range of colors including Poly-Mar HD, Poly-Marble HD, and Poly-Granite HD color range; doors, pilasters and panels may be of different colors.

C. Doors, Partitions, Baffles and Urinal Screen Panels: 1 inch thick; height of panels and doors shall be industry standard or as noted on the Drawings. Doors to be 24" wide typical, 36" wide at disabled accessible stalls unless shown otherwise on the drawings. All edges to be machined to radius of .250". Panel at the end of layout shall extend up and fasten into headrail.

D. Pilasters: 1 inch thick, standard height except in student toilet and shower rooms. These shall be full height, attached securely to solid blocking in ceiling.

E. Top Bracing: 1-1/4” x 1-1/4” 16 ga., tubular steel headrail or continuous aluminum extension with "anti-grip" top threaded through top of pilasters; end closures at all open ends

F. Shower Enclosures: 1" thick pilaster, full height with doors as noted above. Hinges and hardware to be Polymer resin or stainless steel at showers.

G. Hardware and fittings: Except where noted otherwise, all hardware and fittings are to be polished stainless steel on chrome plated rust proof alloy.

1. Pilaster Shoes: Pilaster Shoes shall be made from Polymer resin formed under high pressure and be made of single construction with color throughout. Pilaster shoes shall be anchored to finish floor with No. 5 Plastic Anchors and No. 14 stainless steel phillips head screws.

2. Hinges: Hinges shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with clear anodized finish with wrap around flanges, surface mounted and thru-bolted to doors and pilasters with one-way sex bolts; 8" heavy duty hinges shall be used throughout; gravity type assembly permitting door to rest partially open(30 degrees open at in swing, closed at out swing and handicap accessible); self-lubricating; assembly shall not extend above or below door.

3. Latch: Concealed latch, bumper and keeper; provide additional stop on frame at top of door. Provide slide bolt in HCP stall.
NOTE: All door latches, locks & other operable door hardware shall comply with CBC 11B-404.2.7 and 11B-604.8.1.2

4. Accessories: Door pull and combination coat hook and bumper on each door. Mount hook at 48" maximum in HCP stall.

5. Fasteners: Screws and bolts shall be vandal resistant.

6. Floor to Ceiling Posts: Full height post minimum 1□ inch square steel tube or as approved by Architect.

7. Wall brackets: Full length continuous wall brackets shall be Poly-mar HD weighing not less than .822 lbs per linear foot. Brackets shall be used for all panels to pilaster, pilaster to wall and panel to wall connections. Wall brackets shall be predrilled by manufacturer with holes spaced every 6" along full length of brackets. Wall brackets shall be thru-bolted to panels and pilasters with one-way sex bolts. Attachment of

bracket to adjacent wall construction shall be accomplished by (1) theftproof Zamac mushroom nail in head anchor directly behind the vertical edge panels and pilasters at every 12" along the full length of bracket and (2) No. 5 plastic anchors and No. 14 x 1-1/4" stainless steel Phillips head screws at each 12" interval alternately spaced between anchor connections.

8. Headrail: Headrail shall be heavy aluminum extrusion (6463-T5 Alloy) with mill finish in anti-grip configuration weighing not less than 1.188 lbs. per linear foot similar and equal to Santana Products Co., Inc. section #58993. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way sex bolts. Headrail brackets shall be 16 gauge stainless steel.

H. Special Reinforcement: Provide reinforcing for attachment of grab bars and accessories; coordinate with toilet room accessory supplier.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation, carefully inspect and verify that the installed work of other trades is complete to the point where this installation may properly commence.

B. Verify that toilet partitions may be installed in complete accordance with the original design. Verify solid blocking has been provided in walls and ceilings at all partition locations. Do not install if blocking is missing.

C. In the event of discrepancy, immediately notify the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 INSTALLATION

A. Install all toilet partitions and screens where indicated on the Drawings and reviewed Shop Drawings, anchoring all components firmly in place into solid blocking for long life under hard use and in compliance with manufacturer's recommendations.

B. General: Install partitions and screens rigid, straight, plumb and level. Provide clearances of not more than □□ between pilasters and panels, and not more than □□ between panels and walls and not more than 3/16□ between vertical edge of doors and pilasters. Secure panels to walls with full length, continuous wall brackets. Secure brackets to supporting walls with manufacturer's recommended anchoring devices, as indicated on final shop drawings or in manufacturer's printed instructions.

C. Overhead-braced partitions: Secure pilasters to supporting floor and ceiling with specified anchorage devices. Level, plumb, and tighten. Secure overhead brace to face sheets with not less than 2 fasteners per face. Adjust tops of doors parallel with overhead brace when doors are in closed position.

D. Hardware adjustment: Adjust and lubricate hardware for proper operation after installation.

1. Set hinges on in-swing doors to hold doors open approximately 30□ from closed position when unlatched.

2. Set hinges on out-swing doors to return to fully closed position.

3.03 ADJUSTING AND CLEANING

A. Upon completion, and as a condition of acceptance, visually inspect the entire work of this Section, adjust all components for proper operation and straight alignment, and touch-up all scratches and abrasions to be completely invisible.

B. Upon completion, thoroughly wash surfaces, remove foreign material, polish surfaces. Leave entire work in neat, orderly, clean, acceptable condition as approved. Replace damaged parts, surfaces which are not free from imperfections.

3.04 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

C. Adequately protect products during and after installation against damage of every nature. Exposed finishes shall be free from scratches, dents, permanent discolorations and other defects in workmanship or materials.

END OF SECTION

ART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry, for blocking and backing.

B. Section 10 17 00, Plastic Toilet Partitions.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted.

D. Submit executed Guarantee of Contractor/Subcontractor per Article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

1.06 REFERENCES AND STANDARDS

A. Codes and Standards: Conform to all applicable requirements of CBC, ADA Access and ASTM 446 "Standard Consumer Safety Specifications for Grab Bars and Accessories Installed in a Restroom Area."

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original

bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

B. Verify wall depths are adequate for each item prior to ordering. Notify Architect of conflicts or discrepancies.

1.09 PRODUCTS FURNISHED BY OWNER AND INSTALLED HEREUNDER

A. The following products will be provided by the Owner for installation by Contractor. Provide adequate blocking for attachment. All miscellaneous items are to be provided and installed by Contractor.

1. (none)

PART 2 - PRODUCTS

2.01 MATERIALS

(SEE ATTACHED "TOILET ACCESSORIES STANDARDS – Lodi Unified School District)

2.02 FASTENINGS

A. All toilet accessories shall be complete with all required fastenings. All fastenings shall either harmonize with the item being fastened, or be of the concealed type. All to be theft and vandal-proof.

PART 3 - EXECUTION

3.01 INSPECTION

A. Coordination: Coordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the selected toilet accessories in the locations required (including all recessed items).

B. Prior to installation of the work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

C. Verify that specified items may be installed in accordance with the approved design.

D. In the event of discrepancy, immediately notify the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 PREPARATION

A. The General Contractor shall provide recesses, anchorage and back-up blocking in sizes and in locations as required for proper installation of all accessories. Coordinate with other trades where necessary to make provisions for installation.

B. Securely anchor all items in place in locations and at mounting heights indicated. Where specific dimensions are not noted, installed as directed by Architect.

C. Securely fasten grab bar mounting plates to solid framing or blocking, in accordance with CBC.

D. Provide cut-outs in toilet partitions for napkin disposal units as required.

3.03 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturer's printed instructions where shown or as directed by Architect.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Use concealed vandal-proof fastenings wherever possible. Adhesive installation not permitted. Provide anchors, bolts and other necessary fasteners, and attach accessories securely to walls or toilet partitions as recommended by manufacturer for each item and each type of substrate condition.

D. Grab bars: Solidly anchor grab bars to withstand minimum downward pull of 500 lbs. between any 2 supports after installation.

E. Verify type, location and attachment methods of items furnished by Owner to ensure proper preparation of substrate for solid attachment of accessories.

3.04 CLEANING AND ADJUSTING

A. Upon completion of installation, remove manufacturer's temporary labels, marks of identification. Thoroughly wash surfaces, remove foreign materials, polish surfaces. Leave entire work in neat, orderly, clean, acceptable condition as approved. Replace damaged parts, surfaces which are not free from imperfections.

3.05 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

C. Exposed finish shall be free from scratches, dents, permanent discolorations and other defects in workmanship or material.

END OF SECTION

TOILET ACCESSORIES STANDARDS

Lodi Unfied School District

			WHERE REQUIRED TO BE INSTALLED						
DESCRIPTION	**MFR.**	**MODEL NO.**	**GIRLS**	**BOYS**	**WOMEN**	**MEN**	**UNISEX**	**SUPPLIED BY:**	**NOTES**
GRAB BARS	BOBRICK	B-6806	X	X	X	X	X	GC	
WASTE RECEPTACLE (recessed)	BOBRICK	B-3644			X	X	X	GC	Recessed waste is acceptable for staff toilet rooms- Verify w/ District any waste receptacle prior to specifying
WASTE RECEPTACLE (free standing)	RUBBERMAID	H-3493GR	X	X				GC	40-Gallon, "Square Brute" trash can in grey color. Compatible with 40-45 gallon can liners
WASTE RECEPTACLE (surface mount)									(no specification currently)
TOILET TISSUE DISPENSER	BOBRICK	B-2888	X	X	X	X	X	GC	This is the surface mount 2-roll dispenser
SEAT COVER DISPENSER	BOBRICK	B-221	X	X	X	X	X	GC	Seat cover dispensers are to be installed in **all** toilet compartments and toilet rooms
SANITARY NAPKIN DISPOSAL	BOBRICK	B-270	X		X		X	GC	Sanitary Napkin Disposal units are to be installed in all women, unisex and girls (6th grade and above) toilet compartments and toilet rooms
MIRROR	BOBRICK	B-290	X	X	X	X	X	GC	Provide 18"w. x 30"h. mirror above lavs at Women, Men & Unisex toilet rooms. Provide one 60"w. x30"t. at all middle & high school gang toilet rooms & one 36"w.x 30" t. at elementary gang toilet rooms away from lav wall
SOAP DISPENSER	SC JOHNSON	TPD1LDS	X	X	X	X	X	LUSD	This is a one-liter liquid soap dispenser
PAPER TOWEL DISPENSER	TORK	84TR	X	X	X	X	X	LUSD	This is a high capacity PTD for 8"x1000' rolls
NAPKIN/TAMPON VENDOR	HOSPECO	EV1	X		X		X	LUSD	Napkin/Tampon Vendors are to be installed in all women, unisex and girls (6th grade and above) toilet rooms
Stainless Steel Shelf	BOBRICK	B-296			X	X	X	GC	Use only if needed at staff toilets & where shown

NOTES

1. Recessed accessories are not allowed (with exception of Bobrick B-3644 waste receptacle)
2. All accessories are to be specified per above and statement of "OR EQUAL" must be provided to allow competitors to bid the project
3. All accessories are contractor installed whether or not supplied by LUSD
4. Combo waste & paper tower units are not acceptable

FIRE EXTINGUISHERS

Section 10 44 16
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05 40 00, Cold Metal Framing.

B. Section 06 10 00, Rough Carpentry.

C. Section 09 29 00, Gypsum Wallboard.

D. Section 10 44 00, Fire Protection Specialties.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. All devices shall be approved by Underwriters' Laboratories, Inc., bear UL Label and be approved by the State Fire Marshal.

1.04 SUBMITTALS

A. Refer to Section 01300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted.

D. Submittals shall include the statement that all extinguishers and cabinets comply with the current applicable UL and NFPA classifications and ratings. Include in-wall blocking requirements.

E. Provide written instructions to Owner's personnel in the operation, maintenance and charging of the fire extinguishers furnished.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. Conform to all applicable standards of the National Fire Protection Association (NFPA) and California State Fire Marshal (CSFM) for fire extinguisher cabinets and location.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 EXTINGUISHERS

A. UL Rated 2A-10BC multipurpose chemical extinguishers shall be 5 lb. nominal capacity multi-purpose dry chemical type, bearing U.L. Label; finish shall be red enameled steel: Cosmic Extinguishers by JL Industries.

B. UL Rated Class K 2-A:K wet chemical extinguishers shall be 2-1/2 gallon nominal capacity for commercial kitchen applications, bearing U.L. Label; finish shall be red enameled steel: Saturn Extinguishers by JL Industries.

C. Tamperseals on each extinguisher shall be of the breakable metal type, indicating accidental or unauthorized partial discharge.

D. Pressure gauges on each extinguisher shall be of the dial type.

E. Mounting brackets:

1. Brackets shall be as furnished by the manufacturer of the extinguisher for the equipment specified. Brackets shall be of quick release design, not subject to release by bumping.

2. Bracket attachments shall be furnished with each bracket, suitable for the surface to which attachment is to be made.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation of work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.
B. Verify that specified items may be installed in accordance with the approved design.

C. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 PROTECTION

A. Protect work and materials of this Section and other Sections prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

3.03 INSTALLATION

A. Where exact location of cabinets is not indicated, locate as directed by Architect.

B. Install cabinets in accord with manufacturer's instruction and approved shop drawings.

C. Install so that handle of extinguisher is at 48 inches above finished floor line.

D. Prepare recesses in walls for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions. Provide blocking, backing and other materials necessary for proper attachment and fire rating.

E. Anchor cabinets and brackets securely in place.

3.04 INSTALLATION OF FIRE EXTINGUISHERS

A. Determine approximate completion date of work and then inspect, charge, and tag fire extinguishers not more than 10 days before nor less than one day before actual completion of work.

B. The installation of the specified fire extinguishers in no way relieves the Contractor from providing adequate fire protection during the course of this work.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06 10 00, Rough Carpentry

B. Section 09 29 00, Gypsum Board

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Certification: (Note necessary written certifications, specifically from independent, specialized agencies, such as WIC certificate in 06400; UL rating or label for roofing and doors, etc).

E. Applicator-Manufacturer review (such as for roofing).

F. Pre-Application job site conference (such as for roofing).

G. Tests (such as per wood doors in 08210).

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions and maintenance instructions.

C. Samples: The following examples are required. Submit per Section 01 33 00.

(physical samples are not required)

Manufacturer's full range of colors for Architect's selection.

D. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted

E. Submit executed Guarantee of Contractor/Subcontractor per article 1.05.

1.05 GUARANTEE

A. Refer to General Conditions and Section 01 33 00.

B. Submit fully executed Guarantee with submittal package required by Article 1.04.

C. Provide a written warranty, executed by Contractor, Installer, and Manufacturer, agreeing to repair or replace units, which fail in materials or workmanship within the established warranty period.

D. Limited Lifetime warranty: Subject to the terms in the written warranty, warrant the original purchaser exclusively that the shelving manufactured and installed will be free from defects in materials and workmanship for the lifetime of the shelving.

1.06 REFERENCES AND STANDARDS

A. Title 24, Part 2, CCR, California Building Code.

B. American National Standards Institute (ANSI) Standards

C. American Society for Testing and Materials (ASTM) Standards

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer’s sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer’s written recommendations.

D. Make deliver to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Install shelving after all finish work is completed.

1.09 QUALIFICATIONS

A. Manufacturer Qualifications: Engage an experienced manufacturer who has been manufacturing this type of shelving continuously at the same location for a period of not less than 10 years.

B. Manufacturing Qualifications: Engage an experienced manufacturer whose internal processes meet or exceed ISO 9001 requirements.

C. Installer Qualifications: Engage an experienced installer who is authorized by the manufacturer to install specified shelving and who has done so for a minimum of five years.

1.10 FIELD MEASUREMENTS

A. Subcontractor is to make and be responsible for all field dimensions necessary for proper fitting and completion of work of this section. Report discrepancies to General Contractor before proceeding.

1.11 PROJECT RECORD DOCUMENTS

A. Provide per Section 01 77 00, Contract Closeout and Final Cleaning.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. General: Provide “Clipper” Industrial Shelving as manufactured by Penco or approved equal. All shelving shall comply with SMA and ANSI MH 28.1-1982 and in addition shall have the following components:

1. Posts: Offset angle post shall be roll formed and have overall dimensions of 1-1/8" wide x 2-1/2" deep. The rear flange shall be punched to accept sway braces or backs, the side flange shall be punched to accept side sway braces or side panels. All posts shall be punched for clip or nut and bolt construction. Shelves and accessories are to be vertically adjustable on 1" centers. Side sway braces or side panels to be attached to the side flange of the post. Bolts, nuts, and sway braces or panels shall not obstruct the full adjustability of the shelves.

2. Sway Braces: 12-gauge x 3/4" steel punched at each end for bolting to posts and at the center for strength and ease of assembly.

3. Shelf Clip: One piece 14-gauge rugged compression type to insert into either box or offset angle posts to form a positive four point connection. Clips shall have two claw-like hooks to seat firmly into post slots and two tabs at bottom to seat into post holes for a tight friction connection. All clips for all posts and shelves to be the same. Design shall offer a pre-clipping feature to simplify erection. Finish: zinc plated. All shelves are to have four independently adjustable clips.

4. Shelves: Box formed, extra heavy duty, manufactured from cold rolled steel in 18GA steel that provide shelf capacity of 900 lbs. Shelves have 1-1/4" face on all four sides. Front and rear faces shall have four 90 degree bends providing a 3/4" x

1-1/4" high tubular shape with an 11/16" wide flange seated against the underside of the shelf. The flange is spot welded to the underside of the shelf on 3" centers. Sides have a 5/8" return flange at 90 degrees. All four corners are closed by lapping and spot welding together. Heavy Duty shelf tabs for lapping and welding have formed ribs to maintain a snug fit in the shelf clip. Overall, the shelf depth and width is 1/4" less than nominal. The shelf is punched for divider adjustment on 1-1/2" centers and for attachment of label holders, bin fronts and base fronts. Shelves are available in 36", 42", & 48" widths and 12", 15", 18", 24", 30" & 36" depths.

5. Foot Plates**:** Shall be 13 gauge zinc plated steel and be used to protect floors.

6. Finish**:** All painted parts shall be selected from a minimum of four standard colors. Materials shall be cleaned and phosphatized in a multi-stage process, dried in a 400 degrees oven and electrostatically spray painted with a high-grade enamel paint and baked on at 360 degrees.

7. Accessories: Provide all required floor anchors, wall anchors and overhead bracing as detailed and shown in drawings.

PART 3 – EXECUTION

3.01 INSPECTION

A. For stationary shelving installations, with installer present, examine floor and wall surfaces where shelving will be located and braced. Verify all required blocking in walls has been installed and located per the drawings and details.

B. Prior to installation of this work, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

C. Verify that specified items may be installed in accordance with the approved design.

D. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 INSTALLATION

A. General: Follow manufacturer’s documented instructions and procedures.

3.03 FIELD QUALITY CONTROL

A. Verify all uprights, shelves, components and accessories are plumb and level. Correct if necessary.

B. Replace components that are scratched, dented, or damaged in any manner with new items from the manufacturer. Surface scratches may be touched up but repair must be complete and undistinguishable.

3.04 ADJUSTING

A. Adjust all components and accessories to provide smooth operation and proper alignment.

3.05 CLEANING

A. Upon completion of installation, clean all components and surfaces. Remove all packaging material, rubbish and debris resulting from installation immediately upon completion of work and leave area(s) of installation in neat, clean condition.

3.06 DEMONSTRATION AND TRAINING

A. At Owner's request be available to conduct demonstration of shelf adjustment by manufacturer or dealer authorized representative. Review features and proper operation of accessory items with owner's personnel.

B. At owner's request schedule and conduct maintenance training with owner's maintenance personnel. Training session should include demonstration of shelf adjustment and proper surface cleaning and preservation procedures that end user personnel would normally perform.

3.07 PROTECTION

A. Protect system against damage during remainder of construction period. Advise owner of additional protection needed to ensure that system will be without damage for remainder of work within the area.

END OF SECTION

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, includin[g] [S]upplementary Conditions and Division 01 Specification Sections, apply

1.02 SUMMARY

A. This section includes of furnishing all labor and ma[terials] to provide and deliver all food service equipment herein specified into th[e building] to assemble, set-in-place, level and completely install, exclusive of f[inal connections].

B. Furnish all material and labor required to com[plete, deli]ver and install all Food Service Equipment as specified herein and [as shown on the dra]wings. This work shall be in strict accordance with the plans and [specifications. A]ll dimensions verified in the field prior to any fabrication.

1. Coordinate the Food Service Equ[ipment with the] respective trades performing preparatory work for the installa[tion of the Food Ser]vice Equipment.

2. Comply with all Federal, Stat[e and local re]gulations which bear on the execution of this project. Food servic[e counters shall] be a minimum of 36” wide and tray slides shall be mounted at 34” m[aximum above fi]nished floor.

C. Work Includes:

1. Materials shown on [the Food S]ervice Equipment Schedule.

2. Piping, valves, ar[matures and] accessories that are integral within the equipment.

3. Furnishing co[ntrols and] solenoid valves that are not integral with the equipment, f[or installation by the] mechanical division 15 and/or Electrical Division 16.

4. Wiring, w[ith controls] and mechanical accessories that are integral in the equipme[nt.]

5. Venti[ng with c]ontrols and mechanical accessories that are integral in the equ[ipment.]

6. [Provide] fillers and sealants for mounting equipment securely in place.

7 [Coordinate with] all other contractors on the job including the furnishing of [the] form of drawings, wiring diagrams and other data.

[Supervise] anting after the installation of the food service equipment.

D. [Exclusi]ons include the following:

1. Mechanical

2. Electrical

1.03 QUALITY ASSURANCE

A. QUALIFICATIONS:

1. Installer: Regularly engaged in providing food se n manufacturers of this type of equipment a minir at least 5 installations of this size and type that are at le

B. STANDARD OF MANUFACTURE

1. Food service equipment that is specifie , no manufacture name or model number shall be manufacture Equipment Fabricator with at least five (5) years' experienc esign and fabrication of food service equipment. The manu ect to the review of the Architect and/or Consultant and s he National Sanitation Foundation. All Fabricated equi tructed in strict compliance with the latest standards of the Nati dation and shall bear the mark of the National Sanitation Found ice with all applicable codes and ordinances.

2. All electrically heated or shall bear the seal of approval of the Under writers Laborato y with the National Electrical Code and all local Codes and O

3. All food service eq fied as "buy-out" having a specific manufacture nam r shall comply with the latest editions of the National Sanitation Fou

4. All Gas hea ipment shall be the seal of approval of the American Gas Asso

5. All Ste ed equipment shall conform to the standard of the Amer anical Engineers (ASME) and shall be ASME approved.

6. Fo eze guards shall meet all the requirements of National S n (NSF) Standard 2.

1.04 S

A. S / EQUIPMENT BROCHURES

or fabrication of equipment shall take place until such time as the brochures and shop drawings have been reviewed in writing by the and/or Consultant. Receipt of this review shall not relieve the Contractor

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from the responsibility of verifying all quantities and related di ns, maintaining the specified quality of equipment, and verifying conditions

2. Equipment Brochures; within twenty (20) calendar days ntract, submittals in the form of PDF containing manufacturers s, dimensioned drawings and/or other pertinent data d standard manufacture shall be submitted for review by the Ar ltant. Sheets with the notation "Fabricated Item" and nar tem, as well as any required mechanical, plumbing or electric be inserted between the manufacturer's specification sheet -out" equipment; thus, giving a complete brochure with all times se brochures shall have hard white covers with clear transparer g rings. The name of the Contractor, Architect, Consultant and ified in large readable type. Failure to provide brochures in the above will be cause for rejection of said brochures.

3. Rough-in and Equipment Location Dr (20) calendar days after award of the contract, submittals complete rough-in and details for electrical and plumbir vertical and horizontal dimensions, from column center s for location said connection points and rough-in locations s review by the Architect and/or Consultant. Equipment locati rawn to scale of not less than 1/4" = 1'-0" and include a sched rly identifying all items. Minimum drawings size shall be 24"

4. Shop Drawings; within ays after award of the contract, submittals in the form cation drawings shall be submitted for review by the Archite ant. Plans shall be drawn to scale of not less than 1/2"=1'-0" ws, elevations and sections at 3/4"=1'-0" shall be supplied of all with complete dimensions. All shop practices regarding joints e-downs, supports, etc. shall be clearly defined as well as gau etals and brands and model numbers of all miscellaneou and electrical trim. The drawings shall also show locations of nder another sections) for all wall and ceiling mounted nent. Minimum drawings size shall be 24"x36".

B. SAMPLES

1. Pro ecification requested.

C. SUB

1 ed in this section are used as standards for quality. All all be approved by the Architect and/or Consultant prior to

sion 1 - General Requirements for procedures governing substitutions

3. substitution for each item will be considered.

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4. Installation of any qualified substituted equipment is the Foo ipment Contractor's responsibility. Including any mechanical, ele anges required for the installation of qualified substitution shall cost to the Owner.

D. DEFERRED APPROVAL ITEMS:

1. For the items identified on the Equipment List as tem), the following submittal requirements shall be provid

A. Product data.

B. Manufacturer's recommended metho dinated with actual field conditions for anchorage to act ons.

C. Shop Drawings: Indicate types, s erials, completely dimensioned layouts and config asteners, operators and shop finishes and other requir e calculations for all required connections.

D. Structural calculations, de l additional necessary drawings and specifications for a all be signed by a Structural Engineer licensed in th

E. Provide a copy of th tion and a copy of the manufacturer's written certificatio t of a minimum of (5) five jobs installed by Installation Com one numbers of both the project's General Contractor and

1.05 DISCREPANCIES

A. In the event of d he Contract Documents, the Architect and/or Consultant sha ufficient time prior to bid opening, ten (10) days to allow issuanc

B. In the eve permit notification or clarification of discrepancies prior to the bid o all apply: The drawings and drawing schedules shall govern y; the specifications in matter of quality. In the event of confli volving quantities, or within the specifications involving quality, the high quality shall apply. Such discrepancies shall be noted and cla ors bid. No additional allowances will be made because of errors, a ons which reasonable should have been discovered during the id.

1.0 Y

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A. The work as specified in this division shall include assuring that a ed submittals conform to the intent and meaning of the documents, conditions and all local codes and ordinances.

B. Visit the job site to field check actual wall dimensions and u responsible for furnishing, fabricating, and installing the e nce with the available space and utility services as they exist on t

C. Check all door openings, passageways, elevators, et equipment can be transported to its proper location within the build eck the possibility with the General Contractor of holding v ent of doorjambs, window, etc. for the purpose of moving equipme on.

D. Notify the Architect and/or Consultant of any en the plans and specification prior to fabrication of any equir dition on the job.

E. If any special hoisting equipment and op , include cost as part of the bid for this work.

1.07 DELIVERY AND STORAGE

A. All equipment specified herein sh e job site; received and handled by the Contractor or his authorized shall in no way be expected to store or handle any such equipmen

B. All equipment shall be deli ner as to protect it against dirt, water, chemical or mechanical i

C. Throughout the progre Contractor shall keep the working area free of debris of all types re

D. All packing materi from the project location by the Contractor.

1.08 COORDINATI

A. Coordinate al, electrical, plumbing, interiors and other trades whose work is in ipment specified herein.

1.09 MEASI

A. Veri own on the drawings by taking field measurements at the job site pri quipment or ordering equipment. Proper fit and attachment of all p is the sole responsibility of the Food Service Contractor. If ment shall be fabricated so that it may be handled through finished

1.1 QUIREMENTS

A. Re tion 01 00 10.

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

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1.11 GUARANTEE / WARRANTY

A. All work shall be guaranteed by the Foodservice Equipment ll defects for a term of one (1) year from the date of notice of uarantee shall cover replacement of defective material at the Food ontractor expense, including transportation and labor. This guara ny cost for replacement of parts or work made necessary by care f the equipment by others.

B. The Food Service Equipment Contractor shall pro nse the installation, start-up and service for one (1) year ording the notice of completion of the project; the replacement of a nd other refrigeration devices supplied under this contract. In addi ar free service, the condensing units shall have a five (5) year ; said warranty commencing at the date of completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Metal for construction purposes, ealed, shall be steel of wrought iron sections galvanized by the hot- rication. Bolts, screws, rivets, and similar attachments to this ga e galvanized or brass. Exposed screw and rivet work shall b djacent surfaces, flush and buffed smooth. Finished work sh onstruction marks, dents, or other imperfections; and at the rk, all metal shall be gone over with a portable machine and b perfect surfaces.

B. All materials shall be de. All gauges specified herein shall be minimum and shall all be established after polishing. They shall refer to:

1. U.S. Stand s and plates.

2. Stainles ufactured by one of the following: Allegheny Ludlum Steel C n Rolling Mills, U.S. Steel Corporation.

C. The Co red to furnish a certified copy of the mill analysis of materials to the nsultant.

D. St shall conform to ASTM A240, Type 304 Condition A, 18-8 having a finish shall be acceptable on surfaces of equipment not exposed to all be uniform throughout in color, finish and appearance.

bing and pipe shall be Type 304, 18-8, having a No. 4 finish, and shall er ASTM A213 if seamless or ASTM A249 if welded.

F. Galvanized steel shall be approved grade of copper-bearing stee[illegible] with a minimum copper content of 20%. All sheets to be commercial [illegible]er leveled, bonderized and re-rolled to insure smooth surface. Galvanize[illegible] allowed in the construction and fabrication of any "Fabricater[illegible]

2.02 FINISHES

A. Paint and coatings shall be of an NSF approved type[illegible] conjunction with food service equipment. Such paint or coating sha[illegible] xic, non-dusting, non-flaking and mildew resistant, shall comply wi[illegible] uations and shall be applied in accordance with the recommendation[illegible] er.

B. All exterior, galvanized parts, exposed memb[illegible] here specified to be painted shall be cleaned, properly primed w[illegible] mer, degreased, and finished with two (2) coats of epoxy-base[illegible] paint, unless otherwise specified.

C. Stainless steel, where exposed, shall[illegible] commercial finish. Where unexposed, finish shall be #2B. Th[illegible] hall run in the same direction wherever possible. Where surfac[illegible] ne fabricating process, such surfaces shall be refinished to m[illegible] urbed surfaces.

2.04 ELECTRICAL REQUIREMF

A. Standard UL listed mater[illegible] mponents shall be selected and installed in accordance with NEMA[illegible] ommendations and as required for safe and efficient use and oper[illegible] rvice Equipment without objectionable noise, vibration, and sanita[illegible]

B. Motors up to and[illegible] to be wired for 120-volt, single phase. Fixtures totaling more th[illegible] be wired for 208-volt, single phase. Fixtures having multiple numb[illegible] its, can be wired for three phase with the load balanced as[illegible] within the fixture.

2.07 REFRIGF

A. Each r[illegible] ecification is written to provide minimum specifications and scop[illegible] ion equipment shall be designed and installed to maintain the follo[illegible] rature unless otherwise specified.

a. [illegible] 1.7°C / 35°F
b. [illegible] -23.2°C / -10°F
c [illegible] ators 1.7°C / 35°F
[illegible] ers -23.2°C / -10°F
[illegible] Refrigerators 1.7°C / 35°F
f. [illegible] Freezers -23.2°C / -10°F
g. Colu[illegible] 5°C / 41°F

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PART 3 INSTALLATION

3.01 POSITIONING OF EQUIPMENT

A. Installation procedure, details and scheduling shall be so ork of other contractors may progress without unnecessary delay, ir ge.

B. The Contractor shall do all fitting, joining, fastening, d adjusting necessary to install any fixed item of equipment in on; and shall locate and/or store portable, non-fixed items as d ect and/or Consultant with due regard for the security and age of the items involved.

3.02 WORKMANSHIP

A. Commencement of work shall constitute acceptance of all conditions as found.

B. Equipment shall be installed as sho here abutting, curved or irregularly shaped angles or proje occur, equipment shall be made to conform. Where several piece o be assembled in a group, the group shall be complete as wh y filler or connecting pieces as may be required to make a comple nin-proof group.

C. Welded parts shall be non- mperfections. Welds on galvanized metal shall be ground smooth, ayed with molten zinc or 1200 degrees F to a thickness of .004". Ti ot be acceptable. Welds of stainless steel shall be ground and p l finish and all grained in the same direction.

D. All fixtures, unless eel, shall be finished in sprayed lacquer in color as chosen by the ically stated, in “plastic laminate”; in pattern and/or color as selecte

3.03 POST INSTA URES

A. Prior to be acceptance, all equipment shall be thoroughly cleaned. This sha all stains, paint spots, protective wrapping and coatings, tapes, ust, polishing compounds, etc. and cleaning of floors in food servic n) and signed off by the General Contractor with a copy to the Arch ant.

B. A ast ten (10) days prior to offering for acceptance, all equipment art-up" procedure by a Factory Authorized service dealer. Equipment tested, calibrated and adjusted for normal operation conditions. If ing indicated defects, such defects shall be corrected, and the test repeated to insure a perfect operation of all equipment, prior to final nd for a period ninety day after final acceptance.

C. Upon completion of the project, the Contractor shall furnish the C[illegible]o (2) sets of dimensional prints, data sheets, spare parts lists and operating [illegible]ach piece of mechanical equipment; each set shall be neatly bound in a [illegible]ach set shall be complete with and index of equipment and with a co[illegible] contracts with said agencies to perform these services. In [illegible]he contractor shall submit for review of the Architect and/or C[illegible]ittal to the Owner for his files, copies of service contracts with said [illegible] these services. It shall be the responsibility of this contracto[illegible]d all warranty forms as required.

D. This contractor shall arrange demonstrations of th[illegible]ntenance of all buy-out" equipment by competent instructors. T[illegible]s to take place within ten (10) days prior to the acceptance of [illegible]uction periods shall be scheduled with the Architect and/or Consu[illegible]ays prior to commencement of same, and at times conv[illegible]ct and/or consultant and Owner.

PART 4 ITEMIZED EQUIPMENT SCHEDULE

4.01 FOOD SERVICE EQUIPMENT LIST[illegible]ON

A. Fabricated Equipment: Wherev[illegible]ed Assembly" is used within the list noted below and description o[illegible]pment, it shall be presumed to be followed by the phrase, "cons[illegible]guration, dimension, detail and design as shown on the drawings [illegible]d with workmanship and materials as specified above" and sha[illegible]n detail requirements of the latest edition of the Sheet Metal and A[illegible]tractors National Association (SMACNA), and National Sanitatio[illegible] (NSF Standard 2).

B. All food service eq[illegible]talled per the "Guidelines for Seismic Restraints of Kitchen Equipme[illegible]tal and Air Conditioning Contractors National Association (SM[illegible]

C. All food serv[illegible] comply with the standards of The California Code of Regulation[illegible]2.

D. All food [illegible]shall comply with the current California Energy Commission Applia[illegible]ations.

E. Eq[illegible]ing schedule is listed by Item Numbers shown on Drawings.

F. [illegible]schedule as (OFCI) means Owner Furnished Contractor Installed.

[illegible] ITEMS

ITEM #1 [illegible] REFRIGERATOR

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Quantity: One (1)
Manufacturer: RMI-Econocold (or equivalent)
Model: FABRICATED ITEM
Status: CFCI
Assembly shall consist of one (1) refrigerator compartment; 8'-0"-h ensions (see drawings for dimensions and configuration). Assembly to for as shown on the drawings. Assembly shall be furnished as herein specifie oy RMI (or equivalent).

1. Assemblies shall be N.S.F (Standard 7) approve configuration as shown on the contract drawings. Assemblies s Code of Regulations Title 20 Sections 11601 through 6 Appliance Efficiency Regulations.

2. Panel Construction: Shall consist of exte ormed metal panels formed to ensure proper size. Section e up pines and a double row of closed-cell gaskets to insure p roper seal at each joint. Corner panels to be 90-degree angl direction. (No Wood Construction will be accepted).

3. Insulation: Walls and Ceiling 4" urethane insulation shall be used with thermal conductivity 118 BTU per hour per square foot. U Factor shall not exceed 0.(hall be rated self-extinguishing and fire-retardant type as speci n must remain stable at temperatures up to 260ºF. Floor to be s t Heavy-Duty reinforced for cart storage capable to withs nt load with no deflection.

4. Section Fasteners: A ing section joints shall be fastened together with steel cam-actio e fasteners shall not exceed a 46" on center spacing. All locks m inside with a standard hex type Allen wrench. All sock hed off with a ½" diameter snap cover to match the color of the

5. Hinged Wal ll be installed as shown on the drawings. Door shall be urethan fitting type 42" wide x 80" high (as shown on the drawings " thick plate glass view windows (freezer heated). Each door sh door heater switch and mortise-style lock. Door finish to be 20 el inside and out. Door and door section shall be listed by UL a e following:

ket

d chrome deadbolt latch and cam-lift spring-loaded hinges es shall have a safety release to prevent entrapment of personnel n the box. Latches also have padlocking provisions.
tom of door shall have a double sweep gasket. Magnetic gasket shall e of a dart and ridge design that will allow for easy replacement by the end-user without the use of any tools. The door jamb shall be constructed of a fully welded anodized aluminum rigid frame. The perimeter of the frame shall be no less than two inches wide to provide integral backing to

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

accommodate all required hardware. Freezer doo shall also have a 120-volt jamb and threshold heater with a Sna movable stainless-steel channel and a heated pressure listed by UL.

e. Each entrance door shall be provided with a switch with an indicating pilot light exterior. All switche factory tested per UL.

f. A threshold shall be provided with the d wire shall continue beneath the threshold (freez

g. A digital thermometer shall be includ ection to indicate inside temperature.

6. Lights: Each door section shall be equippe ed constant burning pilot light and switch on exterior and interi n interior LED Fixture Kason 1806. Each compartment shall b g mounted vapor proof LED light fixture with clear prismatic in arbonate diffuser Kason model 1810 or equal, see drawings fr ures shall be factory wired to the light switch at the entrance d all be a minimum of 10-foot candles measured 30" off the finis

7. Finish: Finished: Exterior wall p itchen shall be 22-gauge stainless steel finish. Ceiling panels an e a minimum of .026 galvanized steel with baked enamel em and where concealed shall be .026" galvanized steel. Interior w s shall be .026" galvanized steel and finished in baked enamel ish. Interior kitchen finish floor to meet interior floor panel of w evation for an even transition into walk-in. Contractor to verify fin s and provide an anti-slip surface. Contractor to verify f ss.

8. Accessories: Ass ded with the following accessories.

a. Do or, self-closing and chrome-plated Kason No.1256 C

b. plated Kason No. 1229C with inside safety release.

c. on No. 1094.

d. ere the unit abuts the building wall, they shall be closure strip to match the exterior walk-in wall finish. able ure panels at ceiling. Provide vertical closure strips at all l junctures.

partment shall be provided with a high-temperature alarm Modular Corporation model No. 75 FLUSH mounted. This unit to vided complete with built-in N/O & N/C dry contacts and pulse t for remote notification.

Thermometer: Provide one (1) 4" dia. built into each walk-in door nel.

ressure Relief Port: One (1) for each compartment Kason No. 1830 (heated at freezer only.

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

h. Strip Curtains: each walk-in door shall have polye[illegible]forced clear vinyl strip curtains.
i. Entrance Doors: Each door shall have a 1/8" th[illegible] diamond plate kick panel 3'-0" high on the ext[illegible]or panels and adjacent door jambs.
j. The wall panels exposed to the kitchen sh[illegible] stainless steel rub rail.
k. Provide a stainless-steel interior and ex[illegible]e.
l. Provide necessary backing in wall par[illegible]t
m. Floor to be heavy duty type to suppo[illegible]e to withstand 500-pound point load with no defle[illegible]

9. This assembly shall be installed by factor[illegible]actory-approved installers with written certification provid[illegible]rer to the Architect and Consultant.

10. Walk-in assembly shall be installed [illegible]a as shown on the drawings. Contractor is to verify finishes and [illegible]hen floor and allow for proper clearance at the walk-in door.

ITEM #1.1 COLD STORAGE SHELVING
Quantity: Two (2)
Manufacturer: Metro (or equivalent)
Model: A2136NK3
Status: CFCI
Shelving to be 4-tier units with the b[illegible]um of 12" above finished floor. Provide post clamps to adjacent shelving unit tw[illegible]ack. Provide wall mounting angle brackets at top of shelving as shown.

Accessories:
8 ea. Model A213[illegible]e Super Erecta® Shelf, wire, 36"W x 21"D, Metroseal 3 (corrosion-[illegible]r release system, with Microban® antimicrobial protectio[illegible]
8 ea. Model 7[illegible] SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are gr[illegible]s & numbered at 2" increments, double grooved every 8", Metr[illegible]oated corrosion-resistant finish with Microban® antimicrobial pro[illegible]
16 ea. M[illegible]ecta® "S"Hook, zinc
8 ea. [illegible]recta® Post Clamp, zinc
8 ea. [illegible]tive Leveling Foot for post, chrome

ITEM #1.2 [illegible]ELVING
Quantity[illegible]
Manufa[illegible]valent)
Mode[illegible]
Stat[illegible]
Sh[illegible]s with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps[illegible]ving unit two at front and two at back. Provide wall mounting angle brackets at top of shelving[illegible]

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

Accessories:
8 ea. Model A2442NK3 Super Adjustable Super Erecta® Shelf, w[illegible]troseal 3 (corrosion-resistant) finish, corner release system, with Mic[illegible] protection, NSF
8 ea. Model 74PK3 Super Erecta® SiteSelect™ Post, 74-1/2" [illegible] bolt, posts are grooved at 1" increments & numbered at 2" increm[illegible] every 8", Metroseal 3 Green epoxy coated corrosion-resistant [illegible] antimicrobial protection
16 ea. Model 9995Z Super Erecta® "S"Hook, zinc
8 ea. Model 9994Z Super Erecta® Post Clamp, zinc
8 ea. Model HDFC Decorative Leveling Foot for pos[illegible]

ITEM #1.3 COLD STORAGE SHELVING
Quantity: One (1)
Manufacturer: Metro (or equivalent)
Model: A2448NK3
Status: CFCI
Shelving to be 4-tier units with the bottom shelf at [illegible]e finished floor. Provide post clamps to adjacent shelving unit two at front and t[illegible]all mounting angle brackets at top of shelving as shown.

Accessories:
4 ea. Model A2448NK3 Super Ad[illegible]® Shelf, wire, 48"W x 24"D, Metroseal 3 (corrosion-resistant) finish[illegible]m, with Microban® antimicrobial protection, NSF
4 ea. Model 74PK3 Super E[illegible]ost, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" inc[illegible]t 2" increments, double grooved every 8", Metroseal 3 Green [illegible]n-resistant finish with Microban® antimicrobial protection
8 ea. Model 9995Z Su[illegible] zinc
4 ea. Model 9994Z S[illegible]mp, zinc
4 ea. Model HDFC [illegible]oot for post, chrome

ITEM #1.4 COLD STORA[illegible]
Quantity: One (1)
Manufacturer: Metro (r[illegible]
Model: A2460NK3
Status: CFCI
Shelving to be 4-t[illegible]m shelf at a minimum of 12" above finished floor. Provide post clamps to adjac[illegible] front and two at back. Provide wall mounting angle brackets at top of shelving as [illegible]

Acc[illegible]
4 [illegible]3 Super Adjustable Super Erecta® Shelf, wire, 60"W x 24"D, Metroseal 3 [illegible]stant) finish, corner release system, with Microban® antimicrobial [illegible]SF
[illegible]3 Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts [illegible]d at 1" increments & numbered at 2" increments, double grooved every 8", [illegible]al 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial [illegible]on
4 e[illegible] 9995Z Super Erecta® "S"Hook, zinc

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

4 ea. Model 9994Z Super Erecta® Post Clamp, zinc
4 ea. Model HDFC Decorative Leveling Foot for post, chrome

ITEM #1.5 COLD STORAGE SHELVING
Quantity: Two (2)
Manufacturer: Metro (or equivalent)
Model: A2436NK3
Status: CFCI
Shelving to be 4-tier units with the bottom shelf at a minimum of 1[illegible]. Provide post clamps to adjacent shelving unit two at front and two at back. Pr[illegible]gle brackets at top of shelving as shown.

Accessories:
8 ea. Model A2436NK3 Super Adjustable Super[illegible]36"W x 24"D, Metroseal 3 (corrosion-resistant) finish, corner releas[illegible]an® antimicrobial protection, NSF
8 ea. Model 74PK3 Super Erecta® SiteSele[illegible]djustable leveling bolt, posts are grooved at 1" increments & num[illegible]s, double grooved every 8", Metroseal 3 Green epoxy coated c[illegible]n with Microban® antimicrobial protection
8 ea. Model 9995Z Super Erecta® "S[illegible]
8 ea. Model 9994Z Super Erecta® F[illegible]
8 ea. Model HDFC Decorative Lev[illegible]rome

ITEM #2 WALK-IN FREEZER
Quantity: One (1)
Manufacturer: RMI-Econocold (or e[illegible]
Model: FABRICATED ITEM
Status: CFCI
Assembly shall consist of one ([illegible]ment; Wide x 8'-0" high clear interior dimensions (see drawings for dimensions [illegible]sembly to form the configuration as shown on the drawings. Assembly shall be[illegible]pecified. And as prepared by RMI.

1. Assemblies s[illegible]d 7) approved and formed in the configuration as shown on the cont[illegible]olies shall meet California Code of Regulations Title 20 Sections 1[illegible]ated July 2006 Appliance Efficiency Regulations.

2. Panel C[illegible]sist of exterior and interior die-formed metal panels formed to insure[illegible]edges must have lineup pines and double row of closed-cell gas[illegible]gnment and proper seal at each joint. Corner panels to be 90-de[illegible] in each direction. (No Wood Construction will be accepted).

3. [illegible]Ceiling 4" of "foamed-in-place" urethane insulation shall be used with a [illegible]of not more than 0.118 BTU per hour per square foot. U Factor shall not [illegible] insulation shall be rated self-extinguishing and fire-retardant type as [illegible]nsulation must remain stable at temperatures up to 260ºF. Floor to be same [illegible]t Heavy-Duty reinforced for cart storage capable to withstand 500-pound [illegible] no deflection.

[illegible]steners: All wall, floor and ceiling sections joints shall be fastened together with [illegible] action speed locks. These fasteners shall not exceed a 46" on center spacing. All

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

locks shall be actuated from inside with a standard hex type Allen w All socket ports shall be finished off with a ½" diameter snap cover to match the c ls.

5. Hinged Walk-In Doors: Door shall be installed as shown on the oe urethane insulated, flush-in fitting type 42" wide x 80" high (a gs) with triple-pane 1/4" thick plate glass view windows (freezer hea e furnished with door heater switch and mortise-style lock. Door finish ss steel inside and out. Door and door section shall be listed by U ne following:

   a. Magnetic gasket
   b. Door closer
   c. Polished chrome deadbolt latch and c nges Latches shall have a safety release to prevent entr ithin the box. Latches also have padlocking provisions.
   d. Bottom of door shall have a doubl etic gasket shall be of a dart and ridge design that will all nt by the end-user without the use of any tools. The door ted of a fully welded anodized aluminum rigid fram e frame shall be no less than two inches wide to provide i ommodate all required hardware. Freezer door ja 120-volt jamb and threshold heater with a Snap-On e ss-steel channel and a heated pressure relief vent ass
   e. Each entrance door s . 3-way rocker light switch with an indicating pilot light e e pre-wired, and factory tested per UL.
   f. A threshold shall oor section. Heater wire shall continue beneath the thre ceway.
   g. A digital therm ed with each door section to indicate inside temperature.

6. Lights: Each door sec with a flush-mounted constant burning pilot light and switch on exteri wired to an interior LED Fixture Kason 1806. Each compartment shall g mounted vapor proof LED light fixture with clear prismatic injectior e diffuser Kason model 1810 or equal, see drawings for quantity. Ligh ory wired to the light switch at the entrance door. Lighting level s 10-foot candles measured 30" off the finished floor.

7. Finish: Finis els, exposed to kitchen shall be 22-gauge stainless steel finish. Cei anels shall be a minimum of .026 galvanized steel with baked enamel and where concealed shall be .026" galvanized steel. Interior wall an e .026" galvanized steel and finished in baked enamel embo ior kitchen finish floor to meet interior floor panel of walk-in at sam n transition into walk-in. Contractor to verify finished floor thickness an ace. Contractor to verify finished floor thickness.

8. y shall be provided with the following accessories.

   inges: (3) per door, self-closing and chrome-plated Kason No.1256 Cam-

   or Pulls: Chrome plated Kason No. 1229C with inside safety release.
   oor Closure: Kason No. 1094.
   rim Molding: Where unit abuts the building wall they shall be trimmed with a closure strip to match the exterior walk-in wall finish. Provide removable

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

"drop-in" closure panels at ceiling. Provide vertical clos[illegible] at all building wall junctures.

e. Each compartment shall be provided with a high-ter[illegible]em, Modular Corporation model No. 75 FLUSH mounte[illegible]ided complete with built-in N/O & N/C dry contacts an[illegible]ote notification.

f. Dial Thermometer: Provide one (1) 4" dia. buil[illegible]r panel.

g. Pressure Relief Port: One (1) for each comp[illegible]30 (heated at freezer only.

h. Strip Curtains: each walk-in door shall ha[illegible]d clear vinyl strip curtains.

i. Entrance Doors: Each door shall have [illegible]inum diamond plate kick-panel 3'-0" high on the exterior [illegible]s and adjacent door jambs.

j. The wall panels exposed to the ki[illegible]gauge stainless steel rub rail.

k. Provide a stainless-steel interio[illegible]e base.

l. Provide necessary backing in[illegible]chment

m. Floor to be heavy duty type [illegible]apable to withstand 500-pound point load with no deflectio[illegible]

9. This assembly shall be installed by [illegible]r factory-approved installers with written certification provided by th[illegible]Architect and Consultant.

10. Walk-in assembly shall be insta[illegible]rea as shown on the drawings. Contractor is to verify finishes[illegible]en floor and allow for proper clearance at walk-in door.

ITEM #2.1 COLD STORAGE SHEL[illegible]
Quantity: Five (5)
Manufacturer: Metro (or equivale[illegible]
Model: A2442NK3
Status: CFCI
Shelving to be 4-tier units wi[illegible]a minimum of 12" above finished floor. Provide post clamps to adjacent shelvin[illegible]two at back. Provide wall mounting angle brackets at top of shelving as shown.

Accessories:
20 ea. Mod[illegible]djustable Super Erecta® Shelf, wire, 42"W x 24"D, Metroseal 3 (co[illegible]n, corner release system, with Microban® antimicrobial p[illegible]
20 ea. [illegible]recta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts [illegible]rements & numbered at 2" increments, double grooved every 8", epoxy coated corrosion-resistant finish with Microban® antimicrobial

4[illegible]uper Erecta® "S"Hook, zinc
[illegible]Super Erecta® Post Clamp, zinc
Decorative Leveling Foot for post, chrome

ITE[illegible]RIGERATION
Quanti[illegible]
Manufactu[illegible]one (or equivalent)

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

Model: MPL-2CZ
Status: CFCI

MINI-PAK REFRIGERATION SYSTEM

A. The outdoor air-cooled, refrigeration system is to be U.L. Lis d on the roof of the building. This unit includes the outdoor painted pressors, copper core aluminum finned condenser, electrical contr thin a single assembly and the evaporator coil assemblies, all with t d accessories. All of the component parts, options and accessories v ed, piped and wired, as required by the manufacturer.

B. The outdoor weather housing shall include a wel eaned structural steel frame made of 12 gauge. The exterior housing be manufactured of a minimum of 16-gauge galvanized steel which and cleaned. The frame and shall be painted with a primer coat of er nished with a coat of polyurethane acrylic enamel.

C. All of the component parts, options and ovided, mounted, piped and wired, as required by the manufacture manufactured to operate at: 208-230 volts, 3 phase, 60 hertz.

D. Unit dimensions: 72”L x 36”W x 7 lbs.

COMPRESSOR AND CONDENSER SYST

A. All compressors will be Cope digital scroll, Copelematic or discus. All compressors will be manuf R-448 refrigerants. Each Compressor system shall be filled with oil and will include discharge and suction line vibration protection iscus compressors, dual pressure control with stainless steel braided -dryer, moisture indicating sight glass, flooded head pressure contr heater. *All equipment must meet current DOE regulations.*

B. Each of these s de a receiver tank capable of accepting the entire systems refrig xceeding 90% of its volumetric capacity. Each receiver will be provid ef vent and, at its inlet and outlet and an isolation valve with a servi l compressor systems that will operate at suction temperatu clude a suction line accumulator.

C. The co nclude the Multi-Circuited condenser rated for 120 F ambient, 12 fin enser fan motors with 24 inch fan blades mounted in a venturi con cted by plastic coated fan guards, and flooded head pressure co rs and condenser circuits shall be sized to operate at an average t l between the ambient and condensing temperatures of 20°F.

CONTRO

shall be protected include circuit breakers, start capacitors, and fan cycle ts for each of the condenser fan motors. A fused disconnect will be located tem. A wiring diagram of the refrigeration system shall be provided and e of the refrigerated system. All internal wiring shall be shown on the wiring

EVAPORA S WITH EcoNet DEFROST

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

A. Evaporator coils shall be direct expansion type fabricated of copper ith aluminum fins.

B. All evaporator coils shall be provided with solenoid valve, therm e, thermostat for medium temp evaporators (thermostat for low-te t of the demand defrost system) and wired to the junction box for pos porators come standard in a dual voltage configuration, include ECM will operate at the dual speeds of 1,550 rpm max and 900 rpm min, ar tion with new "wide glide" refrigerants.

C. Low-temperature evaporator coils are to be provided et Defrost Controller, which is factory mounted and programme ule display with navigation buttons. The EcoNet system will precis t and fixture temperatures, using the electronic expansion val nnecessary defrost cycles by measuring compressor run-times in o en needed. The Econet is Title 24 compliant and will reduce evaporato during the off-cycle in order to reduce energy consumption.

ITEM #4 DRY STORAGE SHELVING
Quantity: Four (4)
Manufacturer: Metro (or equivalent)
Model: A2454NC
Status: CFCI
Shelving to be 4-tier units with the bottom sh ' above finished floor. Provide post clamps to adjacent shelving unit two at fron vide wall mounting angle brackets at top of shelving as shown.

Accessories:
12 ea. Model A2454NC Sup recta® Shelf, wire, 54"W x 24"D, chrome-plated finish, corne
12 ea. Model 74P Super Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" inc at 2" increments, double grooved every 8", chrome finish
24 ea. Model 9995Z ok, zinc
12 ea. Model 9994 Clamp, zinc
3 ea. Model SAF Foot Plate Kit, (4) footplates each with a single anchor hole. Zin with staked 1" Round Posts, Spec Sheet 10.16, (Subject to site a viewed with a project site's "engineer of record" prior to sale)

ITEM #4.1 DRY ST
Quantity: One (1)
Manufacturer: M
Model: A2460N
Status: CFCI
Shelving to bottom shelf at a minimum of 12" above finished floor. Provide post clamps to two at front and two at back. Provide wall mounting angle brackets at top of shelvi

454NC Super Adjustable Super Erecta® Shelf, wire, 60"W x 24"D, chrome-ish, corner release system, NSF

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

8 ea. Model 74P Super Erecta® SiteSelect™ Post, 74-1/2"H, adjusta' 'ing bolt, posts are grooved at 1" increments & numbered at 2" increments, doub' `rv 8", chrome finish

16 ea. Model 9995Z Super Erecta® "S"Hook, zinc

8 ea. Model 9994Z Super Erecta® Post Clamp, zinc

2 ea. Model SAFP Seismic Threaded Foot Plate Kit, (4) footp' .e anchor hole. Zinc plated finish, for use with staked 1" Round F 16, (Subject to site approval, should be reviewed with a project si' J" prior to sale)

END SECTIOI

THIS ENTIRE SPECIFICATION SECTION IS DELETED FROM THIS PROJECT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roller shades for manual operation and accessories.

B. Shade fabric.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

B. Section 09 21 16 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

C. Section 09 51 00 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

1.3 REFERENCES

A. ASTM International (ASTM):
1. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Cradle to Cradle Products Innovation Institute (C2C):
1. C2C (DIR) - C2C Certified Products Registry.

C. National Fire Protection Association (NFPA):
1. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
2. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

D. Underwriters Laboratories (UL):
1. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

E. Window Covering Manufacturers Association (WCMA):
1. WCMA A100.1 - Safety of Window Covering Products; 2018.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

B. Preinstallation Meeting: One week prior to commencing work related to this section. Require attendance of all affected installers.

C. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
   2. Do not install shades until final surface finishes and painting are complete.

1.5 SUBMITTALS

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

B. Product Data: Manufacturer's catalog pages and data sheets for products specified including materials, finishes, dimensions, profiles, mountings, and accessories.
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes, accessories, and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.
   5. Manufacturer's Instructions: Include storage, handling, protection, examination, preparation, and installation.
   6. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.
   7. Operation and Maintenance Data: Component list with part numbers, and operation and maintenance instructions.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
   1. Prepare shop drawings on AutoCad or MicroStation format using base sheets provided electronically by the Architect.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements.
   1. Shadecloth Sample: Mark face of material to indicate interior faces.
      a. Test reports indicating compliance with specified fabric properties.
      b. Verification Samples: 6 inches (150 mm) square, representing actual materials, color and pattern.

F. Maintenance Data: Bill of materials for all components with part numbers. Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

G. Warranty: Provide manufacturer’s warranty documents as specified in this Section.

H. Warranty: Manufacturer's warranty documents as specified in this Section.

1.6 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.

C. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

D. Product Listing Organization Qualifications: Organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

E. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

F. Shadecloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC9644, ATCC9645.

G. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified. Initial submittals, which do not include the Environmental Certification will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.

H. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.

I. Recycling Characteristics: Provide documentation that the shade cloth can, and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new

material, without down cycling. Certify that this process is currently underway and will be utilized for this project.

J. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.

1.7 MOCK-UP

A. Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.
   1. Locate mock-up in window designated by Architect.
   2. Mockup Size: Full size.
   3. Mockup Size (WxH): 3 x 3 feet (0.94 x 0.94 m) minimum.
   4. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
   5. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
   6. Do not proceed with remaining work until, mock-up is accepted by Architect.
   7. Retain mock-up during construction as a standard for comparison with completed work.
   8. Do not alter or remove mock-up until work is completed or removal is authorized.
   9. Full-sized mock-up may become part of the final installation.
   10. Full-sized mock-up will become the property of the Owner to be used for spare parts.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in Window Treatment Schedule.

B. Store and handle products per manufacturer's recommendations.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.10 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating warranty for interior shading.
   1. Shade Hardware: 10 years unless otherwise indicated.
      a. Mecho/5 and Mecho/5X with ThermoVeil, EuroVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25 years.
      b. Mecho/7 including bead chain with ThermoVeil, EuroVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25 years.
   2. Standard Shadecloth: Manufacturer's standard twenty-five year warranty.
   3. Ecoveil Shadecloth: Manufacturer's standard ten year warranty.
   4. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas, which are deemed owner’s responsibility.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer and Basis of Design: Mecho, 42-03 35th St.; Long Island City, NY 11101; ASD Tel: 718-729-2020; Fax: 718-729-2941; Email: marketing@mechoshade.com; Web: www.mechoshade.com. or approved equal.

2.2 ROLLER SHADES, MANUAL OPERATION AND ACCESSORIES

A. Shade System; General:
   1. Components capable of being removed or adjusted without removing mounted shade brackets, or cassette support channel.
   2. Smooth operation raising or lowering shades.
   3. Cradle-to-Cradle certified for the complete shade system including operating hardware and shadecloth. Listed in C2C (DIR).

B. Basis of Design: Mecho/7 System as manufactured by Mecho.
   1. Description: Manually operated fabric window shades.
      a. Shade Type: Single Roller.
      b. Shade Type: Double Roller.
      c. Universal drive capability to offset drive chain for reverse or regular roll shades.
      d. Drop Position: Regular roll.
      e. Drop Position: Reverse roll.
      f. Mounting: Ceiling mounted.
      g. Mounting: Recessed in ceiling pocket.
      h. Mounting: Wall Mounted.
      i. Mounting: Window Jamb Mounting.
      j. Mounting: _____.

k. Size (WxH): _____.
l. Size: As indicated on drawings.
m. Fabric: As indicated under Shade Fabric article.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
   a. Material: Steel, 1/8 inch (3 mm) thick.
   b. Double Roller Brackets: Configured for light-filtering and room-darkening shades in one opening.
      1) Light-Filtering Fabric: Room-side of opening.
      2) Light-Filtering Fabric: Glass-side of opening.
      3) Room-Darkening Fabric: Room-side of opening.
      4) Room-Darkening Fabric: Glass-side of opening.
      5) Operating chain pulls for both fabrics configured for the same side of the window.
      6) Operating chain pulls for each fabric configured for opposite sides of the window.
   c. Single Shade Operation Width: Up to 180 inches (4572 mm) dependent on fabric.
   d. Multiple Shade Band Operation: Provide hardware as necessary to operate a maximum of six shade bands, totaling up to 50lbs hanging weight or 360 inches (9144 mm) wide; depending on fabric weight whichever is greater, using a single clutch operator.
   e. Radiused Center Support Brackets: Provide brackets and connectors for radiused window applications.
      1) Maximum Offset: Eight degrees on each side for a 16 degree total offset.
3. Roller Tubes:
   a. Material: Extruded aluminum.
   b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
   c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
   d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
4. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Full wrap fabric-covered bottom bar, flat profile with heat sealed closed ends.
   b. Style: Exposed aluminum bottom bar with matching finials.
      1) Profile: Rectangular.
      2) Profile: _____.
      3) Color: Manufacturer's standard color coordinated with shade fabric selected.

4) Color: To be selected by Architect from manufacturer's standard color selection.
5) Color: _____.
6) Color: As indicated on the Drawings.

c. Style: _____.
d. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.

5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
   a. Heavy-duty, 1/8” steel mounting bracket and integrated steel brake, clutch and sprocket assembly rigidly affix the shade support and user control to the building structure fully independent of the roller tube components.
   b. Permanently lubricated maintenance-free brake assembly employs an oil-impregnated steel hub with wrapped spring clutch.
   c. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.
   d. Direct drive clutch requires no interstitial gear stages or plastic parts between the building structure and clutch ensuring reliable operation across the full range of shade sizes.
   e. Urethane dampened clutch protects bead chain and clutch from failure due to high shock loads during shade operation minimizing down time.
   f. Maximum shade hanging weight of 50 pounds (22.7 kg).
   g. Clutch shall be upgradable to motorized drive on compatible tubes without requiring change in mounting attachment method/location, roller tube or fabric band.
   h. Motorized drive options available require no additional wiring to be added for power or communication capability for switch or automated operation.
6. Drive Chain: Continuous loop T304 stainless steel beaded ball chain, 100 pound (45 kg) minimum breaking strength warranted from breaking for the life of the shade system hardware under prescribed operation. Provide upper and lower limit stops.
   a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
   b. Limit stops: Bead stops affixed to the chain maintain consistent shadeband alignment at the top and bottom of shade travel across multiple shades, and help prevent shade damage resulting from unmanaged user control.
7. Mecho/7, Managed Lift Force, Hardware: Lifts single band or multiband shade assemblies:
   a. Lifting Force: 3 to 8.5 pounds (1.4 to 3.9 kg) max pull force to lift shade assemblies with a shade band hanging weight, not including mounting hardware, of up to 50 pounds (22.7 kg).

b. Direct drive clutch with Managed Lift Force provides the best user experience by managing the user pull force while using the fewest number of chain pulls to position a shade.
c. Backward compatible to Mecho/5 components including fascia, regular and reverse roll, pockets, and wall-mounting accessories.
d. Includes offset drive capability, left/right, front, or back to allow for utilization of blackout channels.
e. Allows for ease of operation when obstructions do not allow for direct drive chain access.
f. Offset chain drive shall not cause an increase of friction or pull force when operated up to a 26 degree angle from vertical.

8. Accessories:
   a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.
      1) Finish: Baked enamel. Color as selected by Architect from full range of colors.
      2) Finish: Clear anodized.
      3) Can be installed across two or more shade bands in one piece.
      4) Single Fascia: Accommodate regular roll shades.
      5) Profile: Square.
      6) Configuration: Continuous, fascia extends past continuous bracket.

C. Basis of Design: Mecho/5x System as manufactured by Mecho.
   1. Description: Manually operated fabric window shades.
      a. Shade Type: Single Roller.
      b. Shade Type: Double Roller.
      c. Universal drive capability to offset drive chain for reverse or regular roll shades.
      d. Drop Position: Regular roll.
      e. Drop Position: Reverse roll.
      f. Mounting: Ceiling mounted.
      g. Mounting: Recessed in ceiling pocket.
      h. Mounting: Wall Mounted.
      i. Mounting: Window Jamb Mounting.
      j. Mounting: _____.
      k. Size (WxH): _____.
      l. Size: As indicated on drawings.
      m. Fabric: As indicated under Shade Fabric article.
   2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
      a. Material: Steel, 1/8 inch (3 mm) thick.

b. Double Roller Brackets: Configured for light-filtering and room-darkening shades in one opening.
   1) Light-Filtering Fabric: Room-side of opening.
   2) Light-Filtering Fabric: Glass-side of opening.
   3) Room-Darkening Fabric: Room-side of opening.
   4) Room-Darkening Fabric: Glass-side of opening.
   5) Operating chain pulls for both fabrics configured for the same side of the window.
   6) Operating chain pulls for each fabric configured for opposite sides of the window.

c. Single Shade Operation Width: Up to 180 inches (4572) dependent on fabric.

d. Multiple Shade Band Operation: Provide hardware as necessary to operate more five shade bands, up to 360 inches (9144 mm) wide; depending on fabric weight, using a single clutch operator.

e. Radiused Center Support Brackets: Provide brackets and connectors for radiused window applications.
   1) Maximum Offset: Eight degrees on each side for a 16 degree total offset.

3. Roller Tubes:
   a. Material: Extruded aluminum.
   b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
   c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
   d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
4. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
   b. Style: Exposed aluminum bottom bar with matching finials.
      1) Profile: Rectangular.
      2) Profile: _____.
      3) Color: Manufacturer's standard color coordinated with shade fabric selected.
      4) Color: To be selected by Architect from manufacturer's standard color selection.
      5) Color: _____.
      6) Color: As indicated on the Drawings.
   c. Style: _____.
   d. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.

5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
    a. Heavy-duty, 1/8” steel mounting bracket and integrated steel brake, clutch and sprocket assembly rigidly affix the shade support and user control to the building structure fully independent of the roller tube components.
    b. Permanently lubricated maintenance-free brake assembly employs an oil-impregnated steel hub with wrapped spring clutch.
    c. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.
    d. Direct drive clutch requires no interstitial gear stages or plastic parts between the building structure and clutch ensuring reliable operation across the full range of shade sizes.
    e. Maximum shade hanging weight of 30 pounds (13.6 kg).
6. Drive Chain: Continuous loop stainless steel beaded ball chain, 100 pound (45 kg) minimum breaking strength. Provide upper and lower limit stops.
    a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
    b. Limit stops: Bead stops affixed to the chain maintain consistent shadeband alignment at the top and bottom of shade travel across multiple shades, and help prevent shade damage resulting from unmanaged user control.
7. Mecho/5x, Managed Lift Force, Hardware: Lifts single band or multiband shade assemblies:
    a. Lifting Force: 3 to 8.5 pounds (1.4 to 3.9 kg) max pull force to lift shade assemblies with a shade band hanging weight, not including mounting hardware, of 30 pounds (13.6 kg).
    b. Direct drive clutch with Managed Lift Force provides the best user experience by managing the user pull force while using the fewest number of chain pulls to position a shade.
    c. Backward compatible to Mecho/5 components including facia, regular and reverse roll, pockets, and wall-mounting accessories.
    d. Includes offset drive capability, left/right, front, or back to allow for utilization of blackout channels.
    e. Allows for ease of operation when obstructions do not allow for direct drive chain access.
    f. Offset chain drive shall not cause an increase of friction or pull force when operated up to a 26 degree angle from vertical.
8. Accessories:
    a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.
        1) Finish: Baked enamel.
            a) Color: Black.

b) Color: White.
c) Color: Bronze.
d) Color: Gray.
e) Color: _____.

2) Finish: Clear anodized.
3) Finish: Fabric wrapped to match shade.
4) Finish: _____.
5) Can be installed across two or more shade bands in one piece.
6) Single Fascia: Accommodate regular roll shades.
7) Single Fascia: Accommodate reverse roll shades.
8) Profile: Square.
9) Profile: Radiused.
10) Profile: _____.
11) Configuration: Captured, fascia stops at captured bracket end.
12) Configuration: Continuous, fascia extends past continuous bracket.
13) Configuration: Captured and continuous, as indicated on drawings.

b. Ceiling Pockets: Premanufactured metal shade pocket for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.
1) Removable closure panel.
2) Ceiling tile support.
3) _____.

c. Room-Darkening Channels: Extruded aluminum side and center channels with brush pile edge seals, SnapLoc mounting base, and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control.

d. Adjustable Multi-band Coupler: Field-adjustable coupler positioned between adjacent shadebands driven by the same clutch facilitates hembar alignment between the bands while maintaining the light gap between the shade bands to no more than 1.25 inch (32mm).

D. Basis of Design: Mecho/5 System as manufactured by Mecho.
1. Description: Manually operated fabric window shades.
a. Shade Type: Single Roller.
b. Shade Type: Double Roller.
c. Universal drive capability to offset drive chain for reverse or regular roll shades.
d. Drop Position: Regular roll.
e. Drop Position: Reverse roll.
f. Mounting: Ceiling mounted.
g. Mounting: Recessed in ceiling pocket.
h. Mounting: Wall Mounted.

i. Mounting: Window Jamb Mounting.
j. Mounting: _____.
k. Size (WxH): _____.
l. Size: As indicated on drawings.
m. Fabric: As indicated under Shade Fabric article.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
   a. Material: Steel, 1/8 inch (3 mm) thick.
   b. Double Roller Brackets: Configured for light-filtering and room-darkening shades in one opening.
      1) Light-Filtering Fabric: Room-side of opening.
      2) Light-Filtering Fabric: Glass-side of opening.
      3) Room-Darkening Fabric: Room-side of opening.
      4) Room-Darkening Fabric: Glass-side of opening.
      5) Operating chain pulls for both fabrics configured for the same side of the window.
      6) Operating chain pulls for each fabric configured for opposite sides of the window.
   c. Multiple Shade Band Operation: Provide hardware as necessary to operate more than one shade band using a single clutch operator.
   d. Radiused Center Support Brackets: Provide brackets and connectors for radiused window applications.
      1) Maximum Offset: Eight degrees on each side for a 16 degree total offset.
3. Roller Tubes:
   a. Material: Extruded aluminum.
   b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
   c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
   d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
4. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
   b. Style: Exposed aluminum bottom bar with matching finials.
      1) Profile: Rectangular.
      2) Profile: _____.
      3) Color: Manufacturer's standard color coordinated with shade fabric selected.
      4) Color: To be selected by Architect from manufacturer's standard color selection.

5) Color: _____.
6) Color: As indicated on the Drawings.

c. Style: _____.
d. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.

5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
   a. Heavy-duty, 1/8” steel mounting bracket and integrated steel brake, clutch and sprocket assembly rigidly affix the shade support and user control to the building structure fully independent of the roller tube components.
   b. Permanently lubricated maintenance-free brake assembly employs an oil-impregnated steel hub with wrapped spring clutch.
   c. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.
   d. Direct drive clutch requires no interstitial gear stages or plastic parts between the building structure and clutch ensuring reliable operation across the full range of shade sizes.
   e. Maximum shade hanging weight of 18 pounds (8.2 kg).
6. Drive Chain: Continuous loop stainless steel beaded ball chain, 100 pound (45 kg) minimum breaking strength. Provide upper and lower limit stops.
   a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
   b. Limit stops: Bead stops affixed to the chain maintain consistent shadeband alignment at the top and bottom of shade travel across multiple shades, and help prevent shade damage resulting from unmanaged user control.
7. Accessories:
   a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.
      1) Finish: Baked enamel.
         a) Color: Black.
         b) Color: White.
         c) Color: Bronze.
         d) Color: Gray.
         e) Color: _____.
      2) Finish: Clear anodized.
      3) Finish: Fabric wrapped to match shade.
      4) Finish: _____.
      5) Can be installed across two or more shade bands in one piece.
      6) Single Fascia: Accommodate regular roll shades.
      7) Single Fascia: Accommodate reverse roll shades.
      8) Two-Piece Double Fascia: Front and rear double fascia.

9) Profile: Square.
10) Profile: Radiused.
11) Profile: _____.
12) Configuration: Captured, fascia stops at captured bracket end.
13) Configuration: Continuous, fascia extends past continuous bracket.
14) Configuration: Captured and continuous, as indicated on drawings.

b. Ceiling Pockets: Premanufactured metal shade pocket for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.
1) Removable closure panel.
2) Ceiling tile support.
3) _____.

c. Room-Darkening Channels: Extruded aluminum side and center channels with brush pile edge seals, SnapLoc mounting base, and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control.

E. Basis of Design: UrbanShade, manual operation. As manufactured by Mecho. Fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
1. Shade Type: Single roller.
2. Shade Type: Double roller.
3. Drop Position: Regular. Fabric falls off roller tube, close to glass.
4. Drop Position: Reverse. Fabric falls off the room-side of the roller tube.
5. Mounting: Ceiling mounted.
6. Mounting: Recess mounted in ceiling pocket.
7. Mounting: Wall mounted.
8. Mounting: Window jamb mounted.
9. Size (WxH): _____.
10. Size: As indicated on drawings.
11. Fabric: As indicated under Shade Fabric article.
12. Brackets and Mounting Hardware: Stamped steel. As recommended by manufacturer for mounting indicated accommodating shade fabric roll-up size and weight.
    a. Double Roller Brackets: Configured for light-filtering and room-darkening shades in one opening.
        1) Light-Filtering Fabric: Room-side of opening.
        2) Light-Filtering Fabric: Glass-side of opening.
        3) Room-Darkening Fabric: Room-side of opening.
        4) Room-Darkening Fabric: Glass-side of opening.
13. Roller Tubes: Extruded aluminum. Capable of being removed and reinstalled without affecting roller shade limit adjustments.

a. Size: As recommended by manufacturer; for installation conditions, span, and weight of shades.
b. Fabric Attachment: Extruded channel in tube accepts vinyl spline welded to fabric edge.
    1) Shade Band: Removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.

14. Hembars: Maintains bottom of shade straight and flat.
    a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
    b. Style: Exposed aluminum bottom bar with matching finials.
        1) Profile: Rectangular.
        2) Profile: _____.
        3) Color: Manufacturer's standard coordinated with shade fabric selected.
        4) Color: To be selected from manufacturer's standard color selection.
        5) Color: _____.
    c. Room-Darkening Shades: Slotted bottom bar with wool-pile light seal.
15. Manual Operation:
    a. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
        1) Brake Assembly: Mounted on a low-friction plastic hub with wrapped spring clutch.
            a) Brake must withstand minimum pull force of 25 lbs (12 kg) in stopped position.
        2) Clutch/Brake Mounting: On support brackets, independent of roller tube components.
    b. Drive Chain: Continuous loop beaded ball chain. Upper and lower limit stops.
        1) Breaking Force: 45 lbf (200 N) minimum.
        2) Chain Retainer per WCMA A100.1: Tensioning device.
    c. Lift Assist Mechanism: Contained in idler end of roller tube. When hanging weights exceed roller tube weight limits. Manufacturer’s standard.
16. Accessories:
    a. Fascia: Removable extruded aluminum. Size as required to conceal shade mounting. Attachable to brackets without exposed fasteners.
        1) Finish: Baked enamel.
            a) Color: Black.
            b) Color: White.
            c) Color: Bronze.
            d) Color: Gray.
            e) Color: _____.

2) Finish: Clear anodized.
3) Finish: Fabric wrapped to match shade.
4) Finish: _____.
5) Can be installed across two or more shade bands in one piece.
6) Profile: Square.
7) Profile: Radiused.
8) Profile: _____.
9) Configuration: Captured, fascia stops at captured bracket end.
10) Configuration: Continuous, fascia extends past continuous bracket.
11) Configuration: Captured and continuous, as indicated on drawings.

b. Ceiling Pockets: Manual Premanufactured metal shade pocket with removable closure panel, for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.

c. Room-Darkening Channels, Standard: Extruded aluminum side and center channels with brush pile edge seals, SnapLoc mounting base, and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control.

2.3 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
1. Vertical Dimensions: Fill Opening from Head to Sill: 1/2 inch (13 mm) space between bottom bar and window stool.
2. Vertical Dimensions: Fill Opening from Head to Sill: 1/2 inch (13 mm) space between bottom bar and finished floor.
3. Vertical Dimensions: Fill Opening from Head to Sill: 1/2 inch (13 mm) space between bottom bar and _____.
4. Vertical Dimensions: Fill Opening from Head to Sill (inch/mm): _____space between bottom bar and window stool.
5. Vertical Dimensions: Fill Opening from Head to Sill (inch/mm): _____space between bottom bar and finished floor.
6. Vertical Dimensions: Fill Opening from Head to Sill (inch/mm): _____space between bottom bar and _____.
7. Horizontal Dimensions: Inside Mounting.
   a. Fill openings from jamb to jamb. No light gap.
   b. Symmetrical Light Gaps on Both Sides of Shade: 3/4 inch (19.05 mm) total.
   c. Symmetrical Light Gaps on Both Sides of Shade (inch/mm): _____ total.

d. Symmetrical Light Gaps on Both Sides of Shade (inch/mm): As detailed on the Drawings.

8. Horizontal Dimensions: Outside mounting.
   a. Cover window frames, trim, and casings completely.
   b. Extend shades beyond jambs on each side: 2 inches (50 mm).
   c. Extend shades beyond jambs on each side (inch/mm): _____.
   d. Extend shades beyond jambs on each side (inch/mm): As detailed on the Drawings.

C. Openings Requiring Continuous Multiple Shade Units with Separate Rollers: Locate roller joints at window mullion centers; butt rollers end-to-end.

2.4 SHADE FABRIC

A. Basis of Design: Shade fabric as manufactured by Mecho.
   1. Solar Shadecloths:
      a. Fabric: Soho: 1100 series. 1 percent open. 2 x 2 basket-weave pattern of fine yarn PVC and polyester blend, same colors as in 1600 (3 percent open) and 1900 series, (5 percent open).
      b. Fabric: Soho: 1600 series. 3 percent open. 2 x 2 basket-weave pattern of fine yarn PVC and polyester blend, same colors as in 1100 (1 percent open) and 1900 series, (5 percent open).
      c. Fabric: Soho: 1900 series. 5 percent open. 2 x 2 basket-weave pattern of fine yarn, PVC and polyester blend, same colors as in 1100 (1 percent open) and 1600 series, (3 percent open).
      d. Fabric: ThermoVeil: 0900 series. 0 to 1 percent visually translucent extra-dense linear weave pattern.
      e. Fabric: ThermoVeil: 1000 series. 2 to 3 percent open, dense linear-weave pattern.
      f. Fabric: ThermoVeil Basket Weave: 1700 series. 1 percent open 2 by 2 dense basket-weave pattern, colors match 1300 (5 percent open), also 126 inches (3200 mm) wide.
      g. Fabric: ThermoVeil Basket Weave: 1500 series. 3 percent open 2 by 2 dense basket-weave pattern, colors match 1300 (5 percent open), also 126 inches (3200 mm) wide.
      h. Fabric: ThermoVeil Basket Weave: 1300 series. 5 percent open, 2 by 2 dense basket-weave pattern, colors match 1500 (3 percent open), also 126 inches (3200 mm) wide.
      i. Fabric: ThermoVeil Basket Weave: 2100 series. 10 percent open 2 by 2 open basket-weave pattern, colors match 1300 (5 percent open) and 1500 (3 percent open).
      j. Fabric: ThermoVeil Reversible Satin Twill Weave: 3000 series. 1 to 2 percent open, with an alternating predominant color in the warp and weft (fill). Reverse side can be used facing interior if specified.

k. Fabric: ThermoVeil Reversible Satin Twill Weave: 3200 series. 1 to 2 percent open, with an alternating predominant color in the warp and weft (fill). Reverse side can be used facing interior if specified.
l. Fabric: ThermoVeil Reversible Satin/Diamond Earthtone Twill Weave: 3300 series. 1 to 2 percent open, with an alternating predominant color in the warp and weft (fill). Reverse side can be used facing interior if specified.
m. Fabric: EcoVeil Screens: 0950 series. TPO Cradle to Cradle Certified, fabric, non-PVC, 1 X 1 basket-weave pattern at 1 percent open. Colors match 1350 (5 percent open) and 1550 (3 percent open).
n. Fabric: EcoVeil Screens: 1350 series. TPO Cradle to Cradle Certified, fabric, non-PVC, 1 X 1, basket-weave pattern at 5 percent open. Colors match 0950 (1 percent open) and 1550 (3 percent open).
o. Fabric: EcoVeil Screens: 1550 series. TPO fabric, Cradle to Cradle Certified, non-PVC, 1 X 1, basket-weave pattern at 3 percent open. Colors match 0950 (1 percent open) and 1350 (5 percent open).
p. Fabric: EcoVeil Sheer: 6750 series. Cradle to Cradle Certified, woven 100 percent polyester, PVC-free, reversible face, (3 percent open). The first shadecloth to pass NFPA 701 flame tests without added chemical flame retardants.
q. Fabric: EcoVeil Sheer: 6850 series. Cradle to Cradle Certified, woven 100 percent polyester, PVC-free, reversible face, (1 percent open). The first shadecloth to pass NFPA 701 flame tests without added chemical flame retardants.
r. Fabric: Acoustiveil Dimout: 0890 series. 0-1 percent open.
s. Fabric: EuroVeil Basket Weave Pattern: 5300. Thin, fine, screen cloth in broad range of colors. 5 percent open.
t. Fabric: EuroTwill Reversible Weave: 6000. Finely woven. 3 percent open. Reverse side can be used facing interior if specified.
u. Fabric: EuroTwill Reversible Weave: 6200. Distinctive, tightly woven twill design, comprised of fine polyester with PVC coating. 1 percent open. Reverse side can be used facing interior if specified.
v. Fabric: EuroTwill Reversible Weave: 6450. A broke twill-weave design comprised of fine polyester with PVC coating. 3 percent open. Reverse side can be used facing interior if specified.
w. Color: Selected from manufacturer's standard colors.
x. Color: Custom color.

2. Blackout Shadecloths:
   a. Fabric: Equinox Blackout: 0100 series. Opaque.
   b. Fabric: Midnite Blackout: 0200 series. Opaque. Acrylic backing, PVC-free, white color reverse side (for exterior). Available 98 inch (24789 mm).
   c. Fabric: Mirrofilm: 0600 series. Transparent.
   d. Fabric: Distinctive Blackout: 0800 series. Opaque.

e. Fabric: Chelsea: 0250 series. Opaque.
f. Fabric: Classic Blackout: 0700 series. Opaque. Vinyl coated fabric blackout material same color reverse side (for exterior).
g. Color: Selected from manufacturer's standard colors.
h. Color: Custom color.

3. Fabric Properties: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
   a. Shade Type: Light filtering shades.
   b. Shade Type: Room darkening shades.
   c. Shade Type: _____.
   d. Material Composition: PVC coated polyester yarns.
   e. Material Composition: 100 percent polyester.
   f. Material Composition: 100 percent TPO coated polyolefin yarn.
   g. Material Composition: Polyester with acrylic backing.
   h. Material Composition: Fiberglass with acrylic backing.
   i. Material Composition: Vinyl coated fabric.
   j. Material Composition: _____.
4. Material Certificates and Product Disclosures:
   a. Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).
   b. Cradle to Cradle Material Health Certificate:
      1) Achievement Level: Silver.
      2) Achievement Level: Bronze.
   c. Health Product Declaration (HPD): Published declaration with full disclosure of known hazards.
   d. Declare label.
5. Performance Requirements:
   a. Flammability per NFPA 701: Pass. Large or small scale test.
   b. Fungal Resistance: No growth when tested per ASTM G21.
   c. Solar Transmittance: _____, nominal.
   d. Visible Light Transmittance: _____, nominal.
   e. Solar Absorption: _____, nominal.
   f. Solar Reflectance: _____, nominal.
6. Openness Factor: _____ percent, nominal.
7. Weight: _____ oz per sq yd (_____ grams per sq m).
8. Roll Width: 63 inches (1600 mm) maximum.
9. Roll Width: 72 inches (1829 mm) maximum.
10. Roll Width: 78 inches (1981 mm) maximum.
11. Roll Width: 84 inches (2134 mm) maximum.
12. Roll Width: 96 inches (2438 mm) maximum.
13. Roll Width: 98 inches (2489 mm) maximum.
14. Roll Width: 126 inches (3200 mm) maximum.
15. Roll Width (in/mm): _____.
16. Color: As selected by Architect from manufacturer’s full range of colors.

17. Color: _____.
18. Fabrication:
    a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
    b. Battens: Manufacturer's standard material, full width of shade, and enclosed in welded shade fabric pocket; locate as indicated on drawings.
    c. Seams for Railroaded Fabric: Manufacturer's standard sewn seam; locate as indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

C. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 INSTALLATION

A. Install shades level, plumb, square, and true per manufacturer's instructions and approved shop drawings. Locate so shade band is at least 2 inches (51 mm) from interior face of glass. Allow proper clearances for window operation hardware. Use mounting devices as indicated.

B. Replace shades exceeding specified tolerances at no extra cost to Owner.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric.

D. Clean roller shade surfaces after installation, per manufacturer's written instructions.

E. Demonstrate operation and maintenance of window shade system to Owner's personnel.

F. Manufacturer's authorized personnel are to train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as a reference, supplemented with additional training materials as required.

3.4 PROTECTION AND CLEANING

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.
   1. Clean soiled shades and exposed components as recommended by manufacturer.
   2. Replace shades that cannot be cleaned to "like new" condition.

END OF SECTION

PART 1 GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.01 RELATED DOCUMENTS

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

B. Contract Documents:
1. Review all contract documents thoroughly prior to bid.
2. NUSD Standards – Matrix.
3. Products listed are from the District Standards.

1.02 SUMMARY

1.02.1 This Section includes but is not limited to:
1.02.1.1 Design buildings, size components to meet performance requirements indicated, coordinate systems to avoid conflicts, and provide all elements necessary to conform to the requirements of this specification and complete the project for occupancy and use subject to all requirements and prevailing codes.
1.02.1.2 Pre-engineered, steel frame, clear span modular buildings, fully code-compliant, complete and ready for use.
1.02.1.3 Slab on grade or lifted concrete stem wall foundation and/or flush to grade.
1.02.1.4 Pre-engineered stairs and platforms.
1.02.1.5 Design and engineering services, labor, materials, equipment, and other services required to obtain approval from the Division of the State Architect (DSA) and complete the work.
1.02.1.6 Transportation from the factory to the site, erection, installation, and finishing at the site including all materials, equipment, and operations described in the Contract Documents.
1.02.1.7 Installation of fire sprinkler systems.
1.02.1.8 Connection to site utilities, including water, sewer, storm drain, gas, fire, data, fire alarm and power.
1.02.1.9 Installation of pipes, conduits, devices as needed for various systems.
1.02.1.10 Coordinate all finishes, equipment, materials and hardware with District Standards Prior to construction.

1.02.2 Add Alternates:
1.02.2.1 Canopies over Administration Entry, Library, Classroom Entry and doorways.
1.02.2.2 Wall Graphics.
1.02.2.3 Entry Reception Desk.
1.02.2.4 Mechanical Screens.
1.02.2.5 Library Tree Sculpture.

1.02.3 Related Sections:
1.02.3.1 Section 13 34 23.01: Pre-Engineered Modular Building - Matrix
1.02.3.2 Section 13 34 23.02: Mechanical Narrative.
1.02.3.3 Section 13 34 23.03: Electrical Narrative.
1.02.3.4 Other related work is specified in pertinent sections elsewhere in the Contract Documents and may or may not be noted in this Section.

1.02.4 Attachments: Geotechnical Engineering and Geologic Hazards Study.

1.03 REFERENCE STANDARDS

1.03.1 AISC 5335 Specification for Structural Steel Buildings Allowable Stress Design, Plastic Design; American Institute of Steel Construction, Inc.

1.03.2 2019 California Building Code (CBC)

1.03.3 Division of the State Architect Interpretation of Regulations (IR) Manual, latest edition.

1.04 DESIGN REQUIREMENTS

1.04.1 Modular Contractor's responsibility for completion of design:
1.04.1.1 Coordinate with Architect for Design completion to the satisfactory of the District requirements.
1.04.1.1.1 Modular to be clear span construction with no interior columns or pilasters. Steel columns at modular corners is acceptable.
1.04.1.1.2 Modular design to be either slab on grade building or concrete floor system with concrete foundation and crawl space with “rat” slab and drainage.
1.04.1.1.3 Documentation to include exact location of utilities to complete the project.
1.04.1.1.4 The Narratives, Mechanical and Electrical, are additional information on specific equipment and items for this project based on performance or criteria the Modular Manufacturer must meet and accept to complete this project.
1.04.1.2 Where applicable coordinate submission to Division of the State Architect office with Project Architect.
1.04.1.2.1 This will include Code compliant approved documentation for construction and placement on District Property.
1.04.1.2.2 Include Architect/Engineered stamp and signed documentation.
1.04.1.3 Modular Contractor must also be the installer of the building.
1.04.1.3.1 Coordination with Site Contractor for placement of Modular.
1.04.1.3.2 Coordination with Site Contractor for exact location of utilities, power, fire alarm, fire sprinkler, and communications hook-ups and operations.
1.04.1.3.3 Coordinate with Site Contractor for Project completion to meet requirements of the District and this Project Specification.
1.04.1.4 Building transportation and placement to include but not be limited to:
1.04.1.4.1 Modules capable of transportation on trailers allowed for shipping on public streets and highways in the State of California.
1.04.1.4.2 The uppermost portion of the module or panel shall not exceed 16 feet from the road surface during transport.
1.04.1.4.3 Include ALL transportation fees, permits, required by the State, County or City

for placement of Modular.

1.04.1.5 Design load criteria:

1.04.1.5.1 Roof live load: 20 psf.

1.04.1.5.2 Floor live load: 100 psf.

1.04.1.5.3 Wind load: 90 mph, exposure C, include positive and negative wind loading. Conform to applicable requirements of DSA IR 16-4 "Wind Load Design for One-Story Relocatable School Buildings (Less than 2000 s.f. in Floor Area)."

1.04.1.5.4 Seismic loads: Ss = 1.5; soil site: Class D; seismic design category E.

1.04.1.5.5 Collateral loads: Dead loads of building systems, in addition to the dead load of the building itself, including but not limited to, fire sprinkler systems and roof mounted equipment or elements.

1.04.1.6 Energy conservation:

1.04.1.6.1 All work shall be subject to Title 24, CCR, Building Standards, Part 6, Division T20, Chapter 2, Subchapter 4, Article 2, on energy conservation regulations and required certification.

1.04.1.7 Provide weathertight and watertight construction at all stages of work.

1.04.1.8 Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range not exceeding that of the maximum annual range of variation found at the Project site, as determined by the National Weather Service records.

1.04.1.9 Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

1.04.1.10 Review and become familiar with all other documents related to this project and these specifications and provide fully code-complainant building, complete and ready for use, free of conflict or omission.

1.04.1.11 Provide secure and safe design conforming to standards of care for similar work prevailing in the area where the Project is located

1.04.2 Contractor's Responsibility for Completion of Project shall Include:

1.04.2.1 Site Contractor shall be responsible for selection and coordinating all construction means, methods, techniques, sequence and procedures.

1.04.2.2 Coordinate with Modular Contractor for delivery and placement of modular units.

1.04.2.2.1 Including on site staging and delivery area.

1.04.2.2.2 Coordination with local jurisdiction on transport and traffic control.

1.04.2.2.3 Placement coordination of heavy equipment related to installation of Modular, including cranes and other heavy lift equipment.

1.04.2.2.4 Provide area for construction of Non-modular building components items requiring on-site construction to complete project.

1.04.2.3 Providing UBC Section 11B "Path of Travel" Code compliant access to the Modular from parking area and off-site sidewalk.

1.04.2.4 Coordinate and pay for all of the following items necessary for execution and completion of the work, temporary or permanent, and whether or incorporated, or to be incorporated into the work:

1.04.2.4.1 Design and Engineering services beyond which is illustrated by the construction documents.

1.04.2.4.2 Labor.

1.04.2.4.3 Materials.

1.04.2.4.4 Equipment.

1.04.2.4.5 Tools.

1.04.2.4.6 Construction equipment and machinery.
1.04.2.4.7 Water.
1.04.2.4.8 Heat.
1.04.2.4.9 Utilities.
1.04.2.4.10 Fire Sprinkler attachment and coordination.
1.04.2.4.11 Gas (Bottled or natural)
1.04.2.4.12 Low voltage communication and Fire Alarm.
1.04.2.4.13 All utilities and utilities attachments to the modular units and assure proper function of each.
1.04.2.5 Assume responsibility for overall completion of building systems in accordance with these specifications and other contract documents and in full cooperation with the Modular Contractor provide fully code compliant buildings complete and ready to use, free of conflict or omission.

1.05 PRODUCTS INSTALLED BUT NOT SUPPLIED BY MODULAR CONTRACTOR:

1.05.1 Site contractor shall provide and pay for all of the following items necessary for proper execution and completion of the entire project site work, temporary or permanent, to be incorporated into the Work for this Project:
1.05.1.1 Construction equipment and machinery including, but not limited to, earth moving equipment and compaction of soil required for installation of modular buildings.
1.05.1.2 Site utilities (water, sewer and storm sewer, electrical, fire sprinkler, fire alarm, and communications).
1.05.1.3 Fencing and security.
1.05.1.4 All other facilities and services necessary, wherever located.

1.05.2 Coordinate with District for items, furniture, supplies to be installed in modular for ready to use options.

1.05.3 Site contractor shall be responsible for selecting and coordinating all construction means, methods, techniques, sequences, and procedures.

1.05.4 Review all Contract Documents thoroughly and coordinate all components to meet performance requirements indicated, coordinate systems to avoid conflicts, and provide all elements necessary to meet the requirements of this Specification and complete the Project for occupancy and use subject to all requirements of prevailing codes.

1.06 SUBMITTALS

1.06.1 Construction Documents:
1.06.1.1 Submit to the Architect complete Plans and specifications including:
1.06.1.1.1 Structural, mechanical, fire sprinkler, and electrical design drawings and details.
1.06.1.1.2 Fire alarm and signals drawings.
1.06.1.1.3 Where applicable: Assisted listening devices.
1.06.1.1.4 Energy efficiency compliance documentation:
1.06.1.1.4.1 Each complete and with all necessary supporting calculations as required to obtain approval of DSA through a standard DSA plan review and backcheck

process, unless otherwise indicated by contract.

1.06.1.2 All drawings, details, specifications, and calculations shall be stamped and signed by an architect, structural engineer, mechanical engineer, electrical engineer, and professionals of such other disciplines as may be necessary or required, all currently licensed by the State of California.

1.06.1.3 Architect will review and comment on these submittal documents and return to modular contractor for corrections.

1.06.1.4 Modular contractor shall incorporate all notations, revisions, or corrections required by Architect within 14 days of receipt. After corrections noted by Architect have been made, Architect will review the corrected documents and shall submit documents to DSA for approval.

1.06.1.5 Following return of reviewed documents from DSA, Project Architect will review and record DSA comments and transmit document to modular contractor for corrections.

1.06.1.6 Modular contractor shall incorporate all notations, revisions, or corrections required by DSA and Architect within 14 days of receipt. After corrections noted by DSA and Project Architect have been made, Project Architect will review the corrected documents and shall schedule DSA backcheck appointment for approval.

1.06.1.7 Project Architect and modular contractor, together with the modular contractor's design professionals as may be required, will attend the DSA backcheck to perform final review and corrections necessary to receive DSA approval.

1.06.1.8 In the event if more than one backcheck appointment is required to achieve DSA approval, the Owner may back charge modular contractor for the costs of Architect's attendance of additional appointments. Such back charges will be implemented in the manner described in the General Conditions of the Contract Documents.

1.06.1.9 All costs for production and revision of submittal documentation shall be borne by the modular contractor.

1.06.1.10 Final DSA approved documents with original stamps and signatures of design engineers, responsible parties, and DSA will be retained by the Project Architect. Copies will be provided to modular contractor for his use in production of buildings and site contractor for coordination of all Work for this Project.

1.06.1.11 Modular contractor shall not submit any document directly to DSA; all submittals shall be made only by the Project Architect.

1.06.1.12 Shop Drawings:

1.06.1.13 Indicate assembly dimensions, locations of structural members, and connections.

1.06.1.14 Wall and roof system dimensions, general construction details, anchorages and method of anchorage, installation, and door, window, and finish schedules.

1.06.1.15 All details necessary to describe the complete building, systems, components and their relationships to work provided under separate contracts, framing anchor bolt settings and their sizes and locations from datum, and structural attachments.

1.06.1.16 Indicate welded connections with AWS A2.4 welding symbols.

1.06.1.17 Indicate net weld lengths.

1.06.1.18 Provide professional seal and signature.

1.06.1.19 Initial submittal to the Architect: One (1) reproducible and three (3) prints of

complete sets of drawings, calculations, and specifications, complete with original stamps and signatures of all design professionals.

1.06.2 Samples: Submit two (2) samples of factory finished materials for each material, product, and color selected, eight by ten inch (8" x 10") in size, or as otherwise specified in the related Sections, illustrating color and texture of finish.

1.06.3 Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement, and all information necessary to coordinate work provided by separate contracts.

1.06.4 Submit original written certifications of the manufacturer and installer qualifications specified in Quality Assurance paragraphs of this Section.

1.06.5 Project Record Documents: Record all changes made during construction and actual locations of concealed components and utilities.

1.07 PERFORMANCE REQUIREMENTS

1.07.1 Design, fabricate, and erect building structure and exterior cladding to withstand:
1.07.1.1 Loads from wind, seismic, gravity, thermally induced and other structural movement, weather exposure, and other conditions of use normally encountered.
1.07.1.2 Applicable loads and combined loads as required by the California Building Code or as indicated by DSA IR.

1.08 QUALITY ASSURANCE

1.08.1 Submit Evidence of Confirming Qualifications:
1.08.1.1 Manufacturer qualifications: Specializing in design and fabrication of modular school building systems of the specific type and quality indicated, in California, for a minimum of 10 years, with evidence of satisfactory completion, including DSA closeout documentation, of minimum of five (5) projects of similar scope and scale within the last five (5) years.
1.08.1.2 Installer qualifications: Specializing in erection and installation of modular building systems for minimum of 10 years with evidence of satisfactory completion, including DSA closeout documentation, of minimum of five (5) projects of similar scope and scale within the last five (5) years, approved and certified in writing by the manufacturer.

1.08.2 Inspection and Material Testing of Prefabricated Buildings Divided Into Two Separate Components:
1.08.2.1 Plant inspection and material testing.
1.08.2.2 Onsite inspection and material testing.
1.08.2.3 All inspectors shall be retained by the Owner.

1.08.3 All materials used, unless otherwise specified, shall be new and of the types and grades specified. Contractor shall furnish confirming evidence satisfactory to the Project Architect upon request.

1.08.4 All workers, in plant or field, shall be skilled and qualified for the work to be performed.

1.08.5 Design structural components, develop shop drawings, and perform shop and sitework under direct supervision of a professional structural engineer experienced in design of this Work and licensed in the State of California:

1.08.5.1 Conform to California Building Code (CBC), Title 24 Parts 1 and 2, and DSA Interpretation of Regulations for submission of design calculations and reviewed shop and erection drawings for acquiring DSA approval.

1.08.5.2 Cooperate with inspectors, regulatory and testing agency or authority, and provide data as requested.

1.08.6 Perform work in accordance with AISC "Specification for Structural Steel Buildings-- Allowable Stress Design, Plastic Design."

1.08.7 Perform welding in accordance with AWS D1.1.

1.08.8 Pre-Installation Meeting:

1.08.8.1 To be conducted at Project site a minimum of one (1) week before starting work of this Section.

1.09 SEQUENCING

1.09.1 Sequence the work to coordinate with the activities of separate contractors and specific sequences as indicated or implied.

1.09.2 Request of provide information concerning activities of this contract or separate contracts to enable efficient sequencing.

1.10 SCHEDULING

1.10.1 Schedule the work to achieve Contract milestones and completion dates indicated.

1.10.2 Deliver and install buildings to insure that [project is completed on schedule. Calculate costs of weekend, overtime or premium time work to accomplish the sched7oe and include these costs in the bid.

1.11 WARRANTY

1.11.1 Correct defective work within a one (1) year period after date of Substantial Completion.

1.12 MAINTENANCE

1.12.1 Provide extra material for Owner’s use in maintenance as specified in the pertinent related sections or as described here-in.

1.13 Fasteners and connectors: Provide minimum five (5) percent additional fasteners over the amount required, for each connection of each module, panel or building

component. Pack, label and identity fasteners for intended use and store on the site in a mutually accepted, secure location. Deliver these surplus fasteners prior to the delivery of Modular to the site.

1.14 DELIVERY, STORAGE, AND HANDLING

1.14.1 Handle work with care. Avoid damage during delivery, erection, and placement.

1.14.2 Replace all damaged work prior to installation. Do not install damaged work or materials.

1.14.3 Deliver prefabricated components, materials, and manufactured items undamaged. Package, wrap, or provide temporary coverings to protect all or parts of buildings from the elements and from transportation damage.

1.14.4 Acceptance at Site: Inspect work as it is delivered. Reject work exhibiting damage and provide new undamaged work. Reject work not accompanied with the in-plant inspector's certificate.

1.14.5 Protect delivered work from weather and related construction operations, including those of other contracts. Maintain work in undamaged condition until erection and placement.

1.14.6 Refer to related Sections for additional specific requirements.

1.14.7 Coordinate with site contractor for staging areas, crane locations, and parking a minimum of one (1) week prior to delivery.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Modular Buildings: Must be pre-qualified with Natomas Unified School District.
1. American Modular Inc., 787 Spreckels Ave, Manteca, CA 95336 209-825-1921.
2. Silver Creek Industries, Inc., 2830 Barrett Avenue, Perris, CA 92571 951-943-5393.
3. JL Modular, 70 Stony Point Road, Suite D, Santa Rosa, CA 95401 707-527-5788
4. Meehleis Modular Buildings, Inc., 1303 E Lodi Avenue, Lodi, CA 95240 209-334-4637.
5. Pre-approved manufacturer by District.

2.2 GENERAL - MANUFACTURED UNITS

A. Modular Buildings: Complete, as indicated and specified, conforming to architectural design and appearance indicated, constructed of modules or panels comprising of exterior walls and roofs as shown. All wall and roof joints watertight and weatherproof. Design to withstand structural loading as required by DSA.

B. Meet all requirements of Title 24 Parts 1 and 2, and Division of the State Architect Interpretation of Regulations. All areas and portions of the Project shall be fully accessible, complying with Chapter 11 of California Building Code and enforcement comments of DSA access compliance review. Coordinate with site contractor all site

related work with path of travel.

C. Design buildings to conform to architectural design and appearance indicated. Select components and design systems to provide functions and amenities indicated, as well as those that are required by the prevailing codes (2019 CBC) and agencies having jurisdiction (DSA), whether or not shown in the Contract Documents.

D. In the event of conflicts, recommend mode of resolution requiring minimum revision to indicated design concept and request direction from Architect. Do not revise or modify design concepts without written acceptance of Architect.

E. The modular building manufacturer's term contract is the minimum scope of work or level of quality to be provided unless otherwise indicated. In the event of conflict between the modular contractor and the site contractor, the DSA approved documents, including this Project manual, having the greater scope or higher quality as specified, including this Section, shall govern. Site contractor to coordinate with modular contractor for exact location of all utility, water, electrical, fire alarm, and connections to complete this Project including location of landscape irrigation and planting.

F. Dimensions and Tolerances: Minimum ceiling height is eight feet (8'-0"). Plan dimensions indicated may vary within tolerances of plus or minus three inches (3") to allow flexibility in module or panelization layouts. Clearly indicate all deviations from indicated dimensions or pitches on shop drawings and request specific review from Project Architect in writing prior to any site construction work and/or completion of DSA plan review.

G. Design buildings to be transportable over highways to the Project site if transportation of components is necessary. Identify potential design conflicts with maximum transportable sizes. Recommend mode of conflict resolution and request direction from Project Architect. Do not construct buildings or components that cannot be transported lawfully or safely on California roadways.

2.3 FOUNDATIONS, FLOORS-ON-GRADE, SUBSTRUCTURE

A. Field Engineering: Site contractor to provide, where required by documentation for this Project, field surveying and field engineering services not otherwise required by the modular contractor for complete installation of all parts of the building and its components for this Project. Locate buildings, utilities, site features, and other construction, and establish elevations and grades from identified benchmarks to ensure proper installation of modular building parts to meet design criteria for this Project.

B. Slab-on-Grade Floor System:

1. Design and provide permanent concrete slab-on-grade system that meets the recommendations of geotechnical reports.
2. Design slabs and structural cross sections to fit within subgrade elevations and finish floor elevations indicated. Select concrete mix designs and reinforcement to provide structural values required within dimensional constraints indicated. Perform all additional subgrade excavation required to provide for thicker structural sections as designed by Contractor's Engineer.

3. Contractor's Engineer is responsible for design of slab-on-grade floor systems in accordance with recommendations of geotechnical reports referenced as related documents.
4. Select and provide vapor barrier system, topical vapor transmission coating, or concrete mix design to ensure that moisture transmission through concrete slab remains below recommended levels of specified floor coverings. All floor slabs shall be acceptable substrates for specified floor coverings, enabling provision of full manufacturer's warranties for floor coverings.
5. Bidder shall be responsible for cost of excavating pad for footings, footings, slab and curbs.

C. Stem Wall Foundation System:
1. Design and provide permanent concrete stem wall system that meets the recommendations of geotechnical reports.
2. Design stem wall structural foundation cross sections to fit within subgrade elevations and finish floor elevations indicated. Select concrete mix designs and reinforcement to provide structural values required within dimensional constraints indicated. Perform all additional subgrade excavation required to provide for interior underfloor crawl space drainage with appropriate drain inlets and drain lines and connect to site sewer

system. Site contractor to coordinate.
3. Modular Contractor's Engineer is responsible for design of stem wall foundation systems in accordance with recommendations of geotechnical reports referenced as related documents of structural engineering practices.
4. Select and provide vapor barrier system, topical vapor transmission coating, or concrete mix design to ensure that moisture transmission through concrete slab remains below recommended level.
5. Bidder shall be responsible for cost of excavation of pad as required for footings and crawl space and export of spoils, as rat slab and underfloor drainage.

D. Slab on Grade or stem wall foundation and concrete floor are both acceptable.

2.4 SUPERSTRUCTURE

A. Steel Frame: Two-dimensional moment resisting steel frame with bolted or welded connections.

B. Provide clear span construction free of interior columns or pilasters.

2.5 ROOF STRUCTURE

A. Roof Structure: Steel beams and purlins, corrugated metal roof deck/shear diaphragm.

B. Roof slope shall be minimum two inches (2") per foot.

C. Roof Overhang - Metal Soffit:
1. All overhangs shall present a pleasing two-part metal facia of same type of material as soffit.
2. Soffits shall be enclosed metal soffit perpendicular to adjacent wall surface.
3. Soffits to include screened section to allow for ventilation (required by code of DSA).

4. Soffit to be neatly closed and sealed.

D. Ventilation:
1. All enclosed attic and soffit areas shall be ventilated per the 2019 CBC codes:
a. Provide venting at locations selected by modular manufacturer to provide minimum cross-sectional free area stipulated by code or by DSA comments.
b. Avoid conflict with other building elements.
c. Show supporting calculations and vent type(s) and locations on shop drawings.

E. Draft Stopping:
1. Enclosed attic and soffit areas shall be draft stopped with durable panel materials per the 2019 CBC codes:
a. Provide draft stops at locations selected by manufacturer to reduce attic and soffit areas to the maximum sizes stipulated by code.
b. Show supporting calculations and draft stop locations on shop drawings.
c. Coordinate design of draft stopping with requirements for attic ventilation to ensure that all enclosed areas are properly ventilated.

2.6 EXTERIOR ENCLOSURE

A. Exterior Walls: Wall framing shall be six-inch (6") metal studs, minimum, and greater as determined by modular contractor's structural engineering review to meet requirements of 2019 CBC codes.

B. Watertight and Weatherproof:

1. Provide complete metal and flexible flashings and trim for watertight and weatherproof construction. Design building envelope flashing systems in accordance with SMACNA standards.
2. All weather-exposed surfaces shall have a weather-resistive barrier equivalent to two (2) layers of Grade D Kraft waterproof building paper conforming to ABC, Title 24, Part 2 for asphalt-saturated rag felt.
3. Barrier shall be free from holes and breaks other than those created by fasteners and construction systems for attachment of the building paper and shall be applied over studs or sheathing of all exterior walls. Such barrier shall be applied weather-board fashion, lapped, and wrapped at corners.
4. Provide sheet metal flashings separating concrete from structure at all perimeter locations.

C. Exterior Plaster:
1. Three-part portland cement plaster, shop or field-applied, with integral color finish coat:
a. Include all screeds, drips, and control joints. Provide and install reveals as shown or as listed. Use District Standards Unless Otherwise Noted.
b. Structa Wire Corporation: 17GaX1 ½" SF CR TT (Twin Track).
c. Control Joint, Casing Beads, and Expansion Joints: Amico
d. Soffit Drop: Stockton Products.
e. Base screeds and vents: Stockton Products.
f. Wall penetration boot/collar flashing: Quickflash Weatherproofing Products, Inc.

g. Color to be selected by Project Architect.

D. Exterior Metal Panels:
1. Manufacturer: Mitsubishi Chemical Composites America, Inc.
a. Contact: 401 Volvo Parkway, Chesapeake, VA 23320; Telephone: (800) 422-7270; Fax: (757) 436-1896; E-mail: info@alpolic.com; website: www.alpolic- americas.com.
b. Proprietary Products/Systems: ALPOLIC Natural Metals Series, Zinc Composite Metal (ZCM).
c. Color: As selected by Architect.
d. Size: 62” W x 196” L
e. Weight: 1.56 lbs/sf
2. Accessories:
a. Flashing and Trim:
b. Shop or field-fabricated from zinc-alloy sheets or ZCM material.
c. Minimum Thickness: [0.031 inch (0.80mm)].
d. Seal against weather.
e. Provide finished appearance.
f. Provide pull-out resistance and flatness.
g. Match surface aspect of adjacent metal wall panels.
1) Flashing Backside Coating:
2) Coating Thickness: 60 microns.
3) Abrasion Resistance, ASTM D968, Method B: 140 liters, minimum.
4) Backer plates: Provide metal backing plates at panel edges, terminations, openings, splices, and where recommended by manufacturer, consisting of Zinc Plus or stainless steel sheet goods formed in configuration and thickness recommended by manufacturer.
5) Cleats: Continuous G90 galvanized cleats, formed in configuration, and thickness as recommended by the manufacturer, minimum 0.0239” (0.60mm).
6) Ventilation Screen: 51% open perforated zinc, 0.039” (1.00mm) thickness, by metal wall panel manufacturer.
3. Exposed Fasteners:
a. Self tapping screws, bolts, self locking rivets and other suitable fasteners designed to withstand design loads.
1) Material: 300 series stainless steel.
2) Heads: Factory applied coating to match color of metal.

E. Insulation:
1. Walls shall have an insulation rating of R-19 minimum.
2. Roof shall have an insulation rating of R-30 minimum. Insulation shall be designed to ensure that there is no condensation on interior surface of the corrugated metal roof deck.
3. Insulation vapor barrier shall be installed to the heated side. Provide type FSK barrier where located above suspended ceilings.
4. Floor shall have an insulation rating of R-30 minimum.
5. Manufacturer: Owens/Corning.

F. Doors and Hollow Metal Frames:
1. Exterior Doors: Flush doors, minimum dimensions three feet by seven feet by 1-3/4 inch (3'-0" x 7'-0", 1-3/4") thick, 18-guage, with steel face sheets and fire resistive

cores. Factory prepare and reinforce for indicated finish hardware, including reinforcement on both faces for closers.

2. Interior Doors: Flush doors, minimum dimensions three feet by seven feet by 1-3/4 inch (3'-0" x 7'-0", 1-3/4") thick, with maple veneer face sheets and fire resistive cores. Finish doors with clear sanding sealer finish. Factory prepare and reinforce for indicated finish hardware, including reinforcement on both faces for closers.
3. Hollow metal frames shall be 16-guage at exterior openings and 18-guage at interior openings, depth to suit wall thickness. Jamb throats shall capture all wall cheating panels or materials. Do not permit paneled finishes butted to door frames returns. Provide three (3) anchors minimum per jamb and adjustable floor anchor at bottom of each jamb. Prepare and reinforce for specified and required hardware, including strike box and reinforcement for closers on all frames.
4. Sound deaden concealed faces with 1/8-inch thick undercoating or fill metal door frame cavity with insulation to attain the sound-deadening requirement. Chemically treat doors and frames for paint adhesion and apply one (1) complete shop coat of metal primer, prepared for field finish specified elsewhere.
5. Design, coordinate, and install door and frame systems with other related work for complete waterproof and watertight systems without conflict or omission in weatherproof enclosures.
6. District Standard Manufacturers:

a. Steel Doors and Frames: Metal Manufacturing Company
b. Knockdown Frames: Timely.
c. Wood Doors: Oregon Door.
d. Door Louvers and Lite Assemblies: Anemostant
e. Sound Attenuations Fill, Spray In-Foam: Owens/Corning and Fomospray.
f. Sound Attenuation, Sealant: Macklanburg-Duncan.
g. Fire Rated Glazing Tape: Anemostant.

G. Windows:

1. Provide thermally broken aluminum nail-fin type windows in configuration shown on the Drawings. Provide operable sections as indicated.
2. Glazing: Provide dual pane insulated glazing with a low-e coating (SolarBan 70XL). Color to be selected by Project Architect.
3. Exterior side of window openings in plaster walls shall self-trim into the plaster.
4. Exterior side of window openings in plywood wall shall have minimum edge clearance on all sides and have one inch (1”) minimum trim on all sides. Refer to exterior elevations for details.
5. Interior side of window openings shall be completely cased with solid wood trim, opaque finish. Windows located or sized so that sill heights are seven feet (7’) or more above floor elevation may be self-trimmed by the wallboard only.
6. Header: Typical window header height shall be the same as the door, unless otherwise shown.
7. Design, coordinate, and install window systems with other related work for complete waterproof and watertight systems without conflict or omission in weatherproof enclosures.
8. District Standard Manufacturers:
9. Glazing: PPG
10. Fire Rated Glazing: Technical Glass Products.
11. Glazing Fire Tape: Pemko.

12. Louver Fire Tape: Pemko.

H. Hardware for Exterior Doors and Interior Doors: Match District Standard Hardware and Keying.
1. Hanging Devices: Hager Companies.
2. Door Operating Trim: Ives.
3. Cylinders and Keying: Lund Equipment.
4. Mechanical locks and Latching Devices: Stanley Best.
5. Conventional Exit Devices: Von Duprin
6. Door Closures: LCN Closers.
7. Door Stops and Holders: Ives
8. Architectural Seals: National Guard Products.
9. Miscellaneous: Vel-Key/Stanley.

I. Painting: Paint all exposed surfaces, including cement plaster. Match District Standard Paints (Kelly Moore).

2.7 ROOFING

1. Design, coordinate, and install roofing systems with other related work.
a. AEP Span, a Division of ASC Profiles, Inc.; Select Seam Narrow Batten.
2. Skylights:`
a. Sunoptics Model No. 800IB and 900 for motorized versions. (Including motorized louvers and light controls).
3. Flashing, Gutters, Trim, and Seismic Joints: Provide complete flashing and trim for watertight and weatherproof construction. All roof drainage diverted to roof drains and drained into downspouts extending to below grade storm drain system.
4. Rain Drainage Work: Downspouts with any part located eight feet (8') or less above finish exterior grade shall be welded Schedule 40 steel pipe construction and brackets. All downspouts extending to finish exterior grade shall be connected to underground storm drain system coordinated with site contractor.

2.8 INTERIOR CONSTRUCTION

A. Partition and demising wall framing shall be six-inch (6") metal studs, minimum, and greater as determined by modular contractor's structural engineer to meet requirements of 2019 CBC codes.

B. Sound Attenuation: All interior partitions shall be provided with fiberglass sound insulation and acoustical sealant at top, bottom, and all openings to create a partition with a Sound Transmission Class (STC) rating of 45 or higher. All interior partitions shall extend full height to the underside of the floor and/or roof deck unless otherwise noted on approved Drawings.

C. Flooring/Base:
1. Provide four-inch (4") high resilient base, coved at resilient flooring and straight type at carpeting, at floor-to-wall junctions and cabinet bases.
2. Carpet: Tandus Centiva. Style to be Persona Accents and color to be selected by Project Architect from manufacturer's standard range. Install per manufacturer's

instructions.

a. Walk-off mat

3. Resilient Flooring:

a. Base bid - linoleum tile, 24” square planks/ 7”x24” planks:

1) Shaw Contract, Joy Squared @ Classrooms, Grain+Pigment @ Administration/Library. Color as selected by Architect.

2) Contractor to allow for two (2) accent colors to be incorporated into a tile pattern.

4. Epoxy Flooring:

a. Dura-A-Flex, Inc., Dexotec, Dur-A-Quartz, Q11-36, Toilet Rooms.

D. Interior Wall Finishes:

1. All walls shall be covered with gypsum wallboard. Gypsum wallboard not concealed by other finishes shall be finished, textured, and painted. Colors as selected by Architect.
2. Tackboard wall: Walls shall be covered with wallcovering over fiber board applied without joints. Wallcovering to be Designtex, color as selected by Architect.
3. Toilet room walls, and other walls backing of water service fixtures, shall have Marlite FRP, Symmetrix, color as selected by Architect. Student toilet rooms shall have FRP (7') in height on all walls. Staff toilet rooms shall have FRP (7’) in height on all walls:

a. FRP shall be installed over moisture proof wallboard.

b. Install according to manufacturer.

4. Custodial room walls and other walls as indicated shall have fiber-reinforced wall panel wainscots to seven feet (7’) high unless otherwise indicated on Drawings.
5. Provide an additional layer of gypsum wallboard at locations where FRP/FRL wall panels abut vinyl covered tack board wall panels to provide flush finish transitions between the two materials.
6. Corridor Wainscot: Walls to receive Pionite fiber reinforce laminate panel (FRL) wainscot, color selected by Architect.

E. Ceiling:

1. Typical ceiling system shall be suspended ceiling system, minimum classification of Heavy Duty per ASTM C635. Grid shall be direct hung in strict accordance with CBC Title 24, Part 2 and DSA IR #25-2.10.
2. Typical acoustical panels shall be 5/8-inch minimum thick, mineral fiberboard, or vinyl-faced fiberglass lay-in panels, square edge, ASTM flame-spread index Class I (O-25), 24 inches by 48 inches modular size, light reflection 75 percent minimum, noise reduction coefficient of 0.65 minimum.

a. Acoustical Tiles: Armstrong. Dune (Fine Fissured) – 1775HRC

b. Kitchen and Servery Acoustical Tiles: Armstrong. Kitchen Zone - 673

c. Suspension Grid Systems – Main: Armstrong 7501HRC

d. Suspension Grid system Cross: XL 752

F. Painting: Paint all exposed surfaces that are not factory finished.

1. Toilet Accessories:
2. Toilet Partitions: Bobrick Sierra Series 1092, color selected by Architect.
3. Grab Bars: Bobrick, stainless steel, concealed fasteners.
4. Mirrors: Bobrick, B-165.
5. Feminine Hygiene Receptacle/Dispenser: Bobrick, stainless steel.
6. Hand Dryer: Excel Dryer, Inc, Xlerator Hand Dryer, XL-SB, stainless steel.

G. Fire Extinguishers:
1. Fire Extinguish Cabinet: Potter-Roemer, Alta 7062-DV
2. Fire Extinguisher (Wall Bracket): Potter-Roemer, 3410 x 7” Diameter x 24” Tall

H. Roller Shades:
1. Provide roller shades at all openings serving classrooms, offices, meeting rooms and library. Roller shades by Lutron, Sivoia Manual.
a. Fabric Style: Basketweave 90, 5%, color selected by Architect.

2.9 PLUMBING

A. Modular contractor shall design and provide a complete plumbing system comprising of:
1. Domestic hot and cold water piping systems.
2. Drain, waste, and vent piping systems.
3. Gas piping system.
4. Plumbing fixtures and trim.
5. Gas and water shut-off valves capable of isolating building systems from site systems.

B. All equipment and systems must comply with California Plumbing Code and Title 24 energy use standards as well as District standards. No “PEX” connectors allowed.
1. Water Closet, Wall Mounted: Kohler, Kingston 1.28 No. K4325
2. Faucet/Valve (WC): Sloan, Royal Optima 111-1.28 ES-S
3. Urinal Wall Mounted: Kohler, Bardon 1/8 GPF No. K-4904-ET
4. Faucet/Valve (UR): Sloan, Royal 186 ES-S HEU 0.125 GPF
5. Lavatory: Kohler, Kingston No. K-2005
6. Faucet/Valve (LAV): Chicago Faucets
7. Sink (Classrooms): Elkay, Model DRKADQ 311965
8. Faucet/Valve (Classrooms): Chicago Faucets, bubbler
9. Sink (Admin): Elkay, Model LRADQ332160
10. Faucet/Valve: Chicago Faucets
11. Sink (Custodial): Elkay
12. Faucet/Valve: Chicago Faucets

C. All piping shall be concealed within the building structure or within chases.

D. Coordinate exact location of connections with site contractor or extend piping systems to points-of-connection with site utilities at locations indicated on Drawings. Provide shut-off valves and grade boxes within five-foot (5’) perimeter of the building. Provide clean-outs in locations required by California Plumbing Code. Coordinate with site contractor to bring clean-outs and grade boxes to finish grade. Coordinate in landscape areas or on concrete/asphalt paved areas with site contractor.

E. Size piping on the basis of fixture or appliance demand and conforming to California Plumbing Code. Provide shut-off and isolation valves to permit maintenance and repair without undue interruption of service to other units. Install piping to prevent damage to structure or pipe supports from thermal expansion or contraction of piping systems.

F. Route and install piping systems to avoid conflicts with structure while remaining

concealed. Provide chases, furring, or enlarged framing to allow piping to pass around structural framing without exceeding code-imposed limits on openings allowed in framing

2.10 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

A. Refer also to **Mechanical Narrative** for specific information.

B. Modular contractor shall design and provide a complete HVAC system comprising of:
1. Forced air unit located in mechanical closet or as exterior hung unit on rear wall side.
2. Ductwork, registers, and air diffusers.
3. Controls.
4. Testing and balancing of ventilation system.

C. Reference Brand Carrier, or equal. Air fillers shall be two inches (2") thick pleated media, disposable type. Filters shall be 30 percent efficient per ASHRAE standard 52.

D. The mechanical ventilation system shall provide a minimum of 15 cubic feet of outside air per minute per occupant, with one (1) occupant per 20 square feet of floor area.

E. The system shall maintain an automatically controlled indoor classroom temperature of 75 degrees F in summer and 70 degrees F in winter with a 40-60 percent relative humidity when the outdoor temperature varies between 100 degrees F dry bulb (70 degrees F wet bulb) and 23 degrees F dry bulb.

F. The system must maintain the specified temperatures when providing outside air as indicated.

G. The equipment and systems must comply with California Mechanical Code and Title 24 energy use standards.

H. HVAC equipment electrical characteristics shall suit the site requirements.

I. Ductwork constructed of galvanized sheet metal in accordance with California Mechanical Code, ASHRAE, and SMACNA Low Velocity Duct Construction Manual, latest editions:
1. All ductwork shall be concealed within the building walls, floor, ceiling, or in soffits or chases, unless specifically shown otherwise in the Architect's Drawings. Request specific direction from Architect for re-routing of ductwork or for use of exposed ductwork. All exposed ductwork shall be round spiral-wound material designed and manufactured for exposed locations.
2. Insulate with one-inch (1”) fiberglass duct wrap with vapor barrier, include one-inch (1”) duct attenuation within eight feet (8’) of HVAC unit.
3. Rigid one-inch (1”) fiberglass or insulated “Flex-Duct" conforming to NFPA 90-A, 90 B and SMACNA Class 1 may be substituted for metal ductwork in accessible concealed portions of the duct system.
4. Registers and diffusers: Provide minimum of two (2) four-way air supply diffusers per room, located to provide maximum feasible air distribution. Diffusers shall not be sized larger than 400 cfm each and shall have a NC-30 or less.
5. Ducted return: Provide ducted return air design. Direct-coupled return air registers are not

acceptable.

2.11 FIRE PROTECTION

A. Design gain USA approved, build and install. a complete fire protection system, if required.

B. Owner will conduct a flow test on the existing hydrant and will provide the results upon request.

2.12 ELECTRICAL

A. Refer also to **Section 13 34 23.03 Electrical Narrative** for specific information.

B. Design and provide a complete electrical system comprising of line voltage power outlets and distribution and panel boards to provide complete operational systems.

C. Provide bonding of all building components to an approved ground as required by DSA IR E- 1, such that the resistance to ground is 25 ohms or less. Grounding tests are to be observed and reported by the onsite inspector. Costs of inspection will be provided by the District.

2.13 LIGHTING

A. Design and provide a complete lighting system comprising of:

1. Interior fixtures of types and quantities to meet the following standards:

a. Selected and spaced to provide minimum overall average illumination of 50-foot candles at desk level (30 inches above floor elevation) and comply with IES recommendations for classroom interiors otherwise.

b. Exterior fixtures to have translucent vandal-resistant housing with corrosion-resistant metal housing, high-pressure sodium or metal-halide type, securely attached to building structure adjacent to all exterior doors and as otherwise required to provide minimum overall average illumination complying with IES recommendations for exterior walkways.

c. All lighting in classrooms and small rooms shall be controlled by occupancy sensors.

d. Exterior lighting shall be controlled by an astronomical timeclock.

2.14 FIRE ALARM AND DETECTION

A. Provide conduit and junction boxes with pull strings for interior and exterior initiation devices, horn-strobes, terminals, and other devices as shown.

B. Seal conduits and boxes with weatherproof covers and leave in condition for components, wiring, and final connections by sitework contractor.

2.15 SIGNAL, DATA, AND TELECOMMUNICATIONS

A. Provide conduit and junction boxes with pull strings for interior and exterior devices.

B. Telecommunications and signal device locations for rough ins will be based on sitework electrical plans and documents.

C. Seal conduits and boxes with weatherproof covers and leave in condition for components, wiring, and final connections by District.

2.16 EQUIPMENT AND FURNISHINGS

A. Cabinets and Casework:
1. Plastic laminate, frameless, custom grade per Woodwork Institute:
a. Countertops and frames to have plastic laminate surfaces. Colors to be selected by Project Architect.

B. Marker Boards: Each classroom shall have six (6) eight-foot (8') long LCS Delux series marker boards as manufactured by Claridge or approved equal, located as shown. Board must be magnetic. At Administration, provide glass marker boards, as manufactured by Claridge or approved equal.

C. Television Wall Brackets: One (1) located in the conference room as indicated. Brackets shall be capable to support an 80-inch flat panel television.

D. Fire Extinguishers and Cabinets:
1. Each exterior door shall be equipped with a pressure type fire extinguisher with 2A-10BC UL rating mounted at a height of four feet (4') on the interior wall near the doorway.

E. Projection Screens (District option):
1. Surface mounted, metal encased, manually operated screens without tab tensioning.
2. Units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed-steel sheet not less than 0.027 inch (0.7 mm) thick or from aluminum extrusions, with flat back design and vinyl covering or baked-enamel finish. Provide units with matching end caps and concealed mounting.
3. Manufacturers are subject to compliance with requirements; provide products by one of the following:
a. Da-Lite Screen Company.
b. Architect approved substitute.

2.17 SITE PREPARATION

A. Site preparation and building pad preparation to be performed by Site Contractor.

B. Perform fine grading within perimeter of building foundations prior to permanent placement of buildings; ensure positive drainage to under-building drains.

2.18 SITE SERVICES

A. Certain site service utilities are provided by site contractor.

B. Site Contractor to connect site service utilities to modular buildings as follows:

1. Rain drainage: Site contractor to connect building systems to stub-out provided by sitework contractor.
2. Sanitary sewer: Modular contractor to connect building systems to stub-out provided by sitework contractor.
3. Domestic water: Modular contractor to connect building systems to stub-out at valve in grade box provided by site contractor.
4. Fire water: Modular contractor to provide post indicator valve and connect building systems to stub-out provided by site contractor.
5. Modular contractor to provide conduit and wire to connect P.I.V. tamper switch to new fire alarm panel.
6. Gas: Modular contractor to connect building systems to stub-out at valve in grade box provided by sitework contractor.
7. Electrical power: Modular contractor to connect conduit raceways from building systems to stub-out provided by sitework contractor. Sitework contractor shall pull conductors and make final connections inside modular building panel.
8. Clock: Modular contractor to connect conduit raceways from building systems to stub- out provided by sitework contractor. Site contractor shall pull conductors and provide active devices and terminations and all final connections inside modular building.
9. Bell: Modular contractor to connect conduit raceways from building systems to stub- out provided by site contractor. Site contractor shall pull conductors and provide active devices and terminations and all final connections inside modular building.
10. Intercom/public address: Modular contractor to connect conduit raceways from building systems to stub-out provided by sitework contractor. Site contractor shall pull conductors, provide active devices and terminations and all final connections inside modular building.
11. Telephone: Modular contractor to connect conduit raceways from building systems to stub-out provided by site contractor. Site contractor shall pull conductors and provide active devices and terminations and all final connections inside modular building.
12. Data/fiberoptic: Modular contractor to connect conduit raceways from building systems to stub-out provided by site contractor. Site contractor shall pull conductors

and provide active devices and terminations and all final connections inside modular building.

13. Television: Modular contractor to connect conduit raceways from building systems to stub-out provided by site contractor. Site contractor shall pull conductors and provide active devices and terminations and all final connections inside modular building.

2.19 ACCESSORIES

A. Modular contractor to provide complete functional buildings:

1. Design, select, and provide all building elements, incidental fasteners, sealants, components, flashings, and fittings necessary to finish the work complete with all performance characteristics as indicated, specified, and as needed to comply with referenced and prevailing codes.

B. No allowances for additional sums will be made for Modular contractor's errors, omissions, or failure to design all required conditions in completion of the building design or construction.

2.20 MIXES

A. Mixes for the Modular Structure: Concrete, mortar, grout, and other mixes shall be designed by the modular contractor's design professionals in conformance with requirements of the Contract Documents.

2.21 FABRICATION

A. Modular Plant Fabrication Required: Perform building fabrication under factory conditions in a plant designed for this type of work. Provide adequate space, equipment, materials, licensed design services, and technical personnel to fabricate, coordinate, assemble, pack, ship, and install all required building components in controlled conditions.

B. Shop welding shall comply with AWS D1.3 for cold-formed steel. Do not commence welding operations until the welding inspector has inspected and accepted materials, joint preparation, equipment, and qualifications of the operators. Unsatisfactory work shall be removed and replaced with conforming work.

C. Provide for temperature expansion/contraction movement and seismic movement of building elements. Design and fabricate expansion control in accordance with prevailing codes and Contractor's design calculations.

D. Fabrication testing and inspection shall be performed at the plant.

E. Do not fabricate until materials are tested and accepted. Do not fabricate with untested materials.

F. Framed Openings: Provide openings of shape, size, location, and design to accommodate systems requiring penetrations. Reinforce openings with structural elements sized to resist loads and vibrations imposed, including mechanical and electrical work. Securely attach all framing to structure.

G. Provide for fabrication and wind loads. Provide temporary bracing to maintain work plumb and in alignment until completion of erection and installation of permanent bracing.

H. Select fabrication methods and processes to avoid transmission of erection or fabrication loads to fabricated members. Avoid locking-in stresses.

I. Prepare all work true to indicated shapes and dimensions required. Form all components true to required shape, accurate in size and radius, square, and free from distortion or defects. Cut materials to precise lengths indicated from field measurements.

J. Machine-roll elements required to be curved or radiused. Do not field bend or "walk-down." Provide true curves; segmented fabrication not allowed.

K. Store completed work at the fabrication plant under conditions that will prevent damage or deterioration until work can be transported to the Project site. Repair damage prior to transport. Do not transport damaged or unacceptable work.

L. Do not store completed work at the Project site. Do not transport completed work until Project site is prepared to accept building modules for prompt installation.

M. In-plant inspection required by DSA with a DSA approval project inspector.

2.22 FINISHES

A. Exterior and interior finishes shall be as indicated on the Drawings. Exposed finishes shall be site-applied to the greatest extent feasible.

B. Painting: All exterior and interior finishes shall be painted.

2.23 SOURCE QUALITY CONTROL

A. Inspection: Plant inspection and material testing shall be performed under the supervision of the in-plant inspector. Provide the inspector with full access to all plant operations involving work under this contract. Notify the inspector in advance of the time and place when operations requiring inspection or observation are to take place.

B. Inspector shall inspect all components for acceptability and issue a written certificate. A copy of the signed certificate shall accompany each building to the site. Do not release components from plant without this certificate.

C. Attach to each module or panel a permanent visible tag indicating the date of manufacture, the manufacturer's serial number, and the DSA application number prior to release from plant for delivery.

D. The inspector shall examine the workmanship of each welder prior to incorporation of the individual's welding into the Work. Unsatisfactory welders shall be removed by the inspector and replaced with qualified personnel. Welders so removed shall be required to pass qualification tests before returning to work.

E. Every layer of weld shall be inspected for quality. Each layer of multiple pass welds shall be fully inspected before the succeeding layer is applied. Each joint shall be inspected for conformance with the Contract Documents. Full penetration butt welds shall be made only in the presence of the welding inspector.

F. Single pass welds may be inspected after the welding is completed, except for conditions requiring continuous inspection.

G. The welding inspector shall use all means necessary to determine the quality of the welds.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that civil, mechanical, and electrical utilities are proper types in correct position.

B. Verify building pads and adjacent subgrades are certified elevations, properly compacted and moisture conditioned.

C. Verify that adjacent structures, foundations, and items in related contracts are proper types in correct positions.

3.2 PROJECT CONDITIONS

A. Coordination of Work:
1. Comply with requirements for coordination specified elsewhere and the following:
a. Make all necessary arrangements with the District's authorized representative and other separate contractors for access to grounds, removal of obstructions, and preparation of delivery routes. This contact shall be made at least 48 hours in advance of delivery of any module, building component, equipment, or material.

B. Visit the site to verify readiness to receive building modules, components, or equipment. If work is delivered before site is prepared to receive it, modular contractor shall be responsible for all costs incurred including, but not limited to, inspector's time and costs accruing to separate contractors or others for accommodating this out-of-sequence work.

C. Continuously coordinate this work with that of separate contractors. Attend progress meetings of separate contractors, cooperate with separate contractors, provide and request all data concerning schedules, access, storage and handling, and all such other information as requested or necessary to fully complete the work, free of conflicts or omissions.

3.3 INTERFACE WITH OTHER WORK

A. Coordinate the modular building erection and installation with other contracts. Ensure construction of complete and functional systems, free of conflict or omission. Allow access to other contracts to complete work related to this contract.

3.4 SEQUENCING

A. Sequence the work to coordinate with the activities of separate contractors and specific sequences as indicated or implied.

B. Sequence work to avoid interference with adjacent construction.

C. Request or provide information concerning activities of this contract or separate contracts to enable efficient sequencing.

3.5 SCHEDULING

A. Schedule the work to achieve Contract milestones and completion dates indicated.

B. Deliver and install buildings to ensure that Project is completed on schedule. Calculate costs of weekend, overtime, or premium time work to accomplish the schedule and

include these costs in the bid.

3.6 TRANSPORTING AND STORAGE

A. Transport prefabricated components from fabrication plant to Project site.

B. Coordinate component delivery in time for erection in intended locations. Do not store components onsite prior to completion of foundations or site preparation. No Exception.

3.7 ERECTION STEM FOUNDATIONS AND SLABS

A. General: Verify elevations and perform excavation required for foundations, footings, etc. prior to installation of foundation materials. Conform to DSA foundation and slab requirements.

B. Prepare formwork, embedment's, and reinforcements, and place concrete as specified by modular contractor's engineer.

C. Finish, cure, and patch concrete as specified by modular contractor's engineer. Coordinate all sitework with site contractor.

3.8 ERECTION GENERAL

A. Erection shall be performed by personnel experienced in the delivery and erection of modular and relocatable structures. All building joints shall be capable of being rigidly connected in order to maintain positive alignment of floors, walls, and roofs.

B. Verify that floor slab and placed anchors are in correct position.

C. All work shall be installed plumb, level, true to line and plane, in strict conformance with the DSA approved shop drawings, and as specified by modular contractor's engineer.

D. Erect framing in accordance with AISC Specification for Structural Steel Buildings.

E. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.

F. Set column base plates with non-shrink grout to achieve full plate bearing.

G. Do not field cut or alter structural members without approval.

H. Install bolts as indicated on shop drawings. Provide washers under all nuts. Draw up all nuts tightly. Install high-strength bolting in accordance with prevailing code.

I. After erection, prime welds, abrasions, and surfaces not shop primed.

3.9 INSTALLATION ACCESSORIES

A. Install components and accessories as specified in their respective Sections and in accordance with modular manufacturer's instructions.

B. Install trims and finishes neatly, free of gaps, holes, cut edges, frays, or ravels. Conceal fasteners wherever possible.

C. Seal wall and roof accessories watertight and weather tight with sealant.

FIELD QUALITY CONTROL

D. Onsite inspection shall be performed by the Owner's site inspector. All work performed at the site shall be subject to the inspection of the site inspector. Inform the site inspector as to progress of work and dates when sitework will occur.

E. Coordinate inspections with those required for other contracts, to the greatest extent feasible.

F. Grounding tests of building electrical systems are to be observed and reported by the onsite inspector. Costs of inspection will be provided by the District.

3.10 TOLERANCES

A. Framing Members: 1/8 inch from level; 1/8 inch in ten feet (10') non-cumulative, from plumb.

B. Siding and Roofing: 1/8 inch from true position.

C. Other Elements: As specified in the respective related Parts.

3.11 PROTECTION

A. Repair or replace damaged work prior to acceptance.

3.12 ADJUSTING AND CLEANING

A. Prior to Project Architect's punch list, adjust work for complete and functional operation and appearance.

B. Following punch list, perform all adjustments as noted by the Project Architect and maintain the work in this condition until acceptance by the Owner.

3.13 DEMONSTRATION

A. Demonstrate proper operation of all building elements and features to Project Architect and Owner.

3.14 MAINTENANCE

A. Provide extra materials for Owner's use in maintenance as specified in the pertinent related Sections.

B. Fasteners and Connectors: Provide a minimum of five percent (5%) additional fasteners over the amount required for each connection of each module and panel of building component. Pack, label, and identify fasteners for intended use and store on the site in a mutually accepted, secure location. Deliver these surplus fasteners prior to the delivery of building modules to the site.

RESPONSIBILITY MATRIX

Responsibility Matrix				
Description	**Site Contractor**	**Modular Contractor**	**Others**	**Comments**
Division 01 – General Requirements:				
All Work Within the Perimeter of the Modular Building		X		.
All Work Outside the Perimeter of the Modular Buildings Not Specifically Identified Below	X			
Full-Time Supervision for Modular Crew Onsite		X		Factory Trained Crew
Temporary Facilities:				
Set-up Staging Area for Modular	X			Location acceptable to District.
Temporary Site Security Fencing	X			
Field Office Trailer	X			Field Office for IOR and Contractors
Temporary Power	X			
Permit and Utility Charges for Start-Up and Testing	X			
Temporary Water	X			
Temporary Fire Water	X			

Temporary Dumpster and Toilets	X			
Division 02 – Existing Conditions:				
Site Demo Removal and Excavation	X			
Rough Grading	X			Coordinate with Modular Manufacturer.
Division 03 – Concrete:				
Design (Geotech Report by Others)			X	
Over-Excavation and Pad Prep with Certified Pad	X			

Surveying and Foundation Staking	X			
Modular Footings and Stem Walls and Crawl Space		X		
Crawl Space Slurry		X		
Foundation Vents and Grills		X		
Building Slab-on-Grade		X		
Building Mow Strips	X			
Off-Haul Footing Spoils		X		
Retaining Walls:				
Non-Modular Site Foundations	X			
Elevator Foundations / Curbs		X		
Division 05 – Metals:				
Design		X		
Steel Framing		X		
Stair Structures		X		
DI Grates	X			
DF Rails on New Building		X		
Foundation Vent Grates		X		
Modular Building Flashings and Weep Screens		X		
Modular Gutters and Downspouts		X		
DF Rails at Site DFs	X			
DI under Modular Building with Crawl Spaces		X		
DI Grates	X			
Canopies, Trellis'		X		
ADA Modular Building Handrails		X		
ADA Modular Building Guardrails		X		
ADA Site Handrails	X			
ADA Drinking Fountain Handrails	X			

ADA Site Handrails	X			
Description	**Site Contractor**	**Modular Contractor**	**Others**	**Comments**

PRE-ENGINEERED MODULAR BUILDINGS

Section 13 34 23
21-32-051

Division 06 – Wood, Plastics, and Composites:				
Wall Framing		X		
Building Insulation		X		
Exterior / Interior Trim		X		
Wood Siding / Soffits		X		
Division 07 – Thermal and Moisture Protection:				
Gutters and Downspouts		X		
Roof Drains/Scuppers		X		Modular Contractor to coordinate with Site Contractor for placement
Roofing – Standing Seam Metal Roof		X		
Built-up Roof on Modular		X		
Modular Building Damp Proofing and Waterproofing		X		
Elevator Pit Water Proofing		X		
Division 08 – Openings:				
Doors		X		
Door Hardware		X		
Windows		X		
Storefront		X		
Solatube Skylights		X		
Roll-Up Doors		X		
Classroom Partitions		X		
Division 09 – Finishes:				
Acoustic Ceilings	X			
Gypsum Board		X		
Ceramic Tile		X		
FRP Wall Finish		X		
Lath and Plaster		X		
T-111 Wood Siding		X		

Hardie Siding		X		
Metal Siding		X		
Lap Siding		X		
Tackboard		X		
Painting and Coatings		X		
Painted Mascot and Logos on Buildings	X			
Description	**Site Contractor**	**Modular Contractor**	**Others**	**Comments**

PRE-ENGINEERED MODULAR BUILDINGS

Section 13 34 23
21-32-051

Division 10 – Specialties:				
Monument Signage	X			
Site Sunshades	X			
Toilet Partitions		X		
Toilet Accessories		X		
Building Fire Extinguishers		X		
Building ID and ADA Signage		X		
Site Signage	X			
Division 11 – Equipment:				
Food Service Equipment		X		
Projection Screens		X		
Smart TV's			X	.
Whiteboards		X		
Division 12 – Furnishings:				
Casework and Countertops		X		
Window Coverings		X		
Furniture			X	
Division 13 – Special Construction:				
Modular Buildings:				
Design and Engineering, Structural, and MEP		X		
Manufacture Buildings		X		
Deliver, Set, and Connect		X		
All Finishes		X		
Light Weight Concrete Subfloors within Building		X		

Light Weight Concrete at Balcony 2nd Floor		X		
Welded Wire Mesh at Balconies		X		
Stairs and Footings		X		
Description	**Site Contractor**	**Modular Contractor**	**Others**	**Comments**

Division 14 – Conveying Equipment:				
Elevator ADA Compliant Threshold		X		
Elevator ADA Coordination		X		
Division 21 – Fire Suppression:				
Fire Sprinkler Design		X		
Fire Sprinkler System		X		
Fire Service – Underground to Above Floor	X			
Fire Riser		X		
Flow and Tamper Switches		X		
Site Hydrants	X			Coordinate with local Fire Dept for hydrant Testing.
Division 23 – Heating, Ventilating, and Air Conditioning (HVAC):				
Design		X		
HVAC Equipment		X		
All Building Plumbing and Trim		X		
Condensate Drain and Drywell		X		
Drinking Fountains at Modular Buildings		X		
Drinking Fountains Not Attached to Buildings	X			
Energy Management System/BMS	X			
Connect Bell and Flow Switch to FA System and Provide Power	X			
Division 26 – Electrical:				

Design – Power and Lighting		X		
Transformers in Building (if required)		X		
MDP in Building		X		
Subpanels in Building		X		
Lighting		X		
Grounding, Install and Test		X		
Description	**Site Contractor**	**Modular Contractor**	**Others**	**Comments**

Site Power and Lighting	X			
Integration and Networking to BMS	X			
Solar System/Array	X			
Division 27 – Communications:				
Telephone/Telecom Systems:				
Design	X			
Empty Conduit and Back Boxes in Building		X		
Conduit to Building	X			
Telephone System and Testing	X			
Data:				
Design	X			
Empty Conduit and Back Boxes in Building		X		
Conduit to Building	X			
Data Equipment and Cabling	X			
IDF Cabinet	X			
Power for IDF		X		
Clock/Bell/Intercom:				
Design	X			
Empty Conduit and Back Boxes in Building		X		
Conduit to Building	X			
Equipment and Cabling	X			
AV Systems:				
Design	X			
Classroom Projector and Mounts	X			
Classroom AV System	X			
Power for Classroom Projectors		X		
Assistive Listening System	X			

Division 28 – Electronic Safety and Security:				
Fire Alarm:				
Design	X			
Empty Conduit and Back Boxes in Building		X		
Conduit to Building	X			
Description	**Site Contractor**	**Modular Contractor**	**Others**	**Comments**
All Fire Alarm Control	X			

and Annunciator Panels				
Power for FACP/FAEP (in modular buildings)		X		
FACP/FAEP	X			
Security System:				
Design	X			
Empty Conduit and Back Boxes in Building		X		
Conduit to Building	X			
Cameras and Equipment	X			
Division 31 – Earthwork:				
Site Clearing:				
Grubbing	X			
Earthwork – Rough Grading	X			
Grading:	X			
Excavation and fill: General	X			
Excavation and fill: Modular		X		
Finish Grading and Re-Grading After the Form Work is Removed by the Modular Contractor	X			Modular Contractor to coordinate ALL utilities hook- up with Site Contractor
Erosion and Sediment Control	X			
Soil Treatment	X			
Soil Stabilization (Lime)	X			
Division 32 – Exterior Improvements				
Asphalt/Concrete:				
Driveways/Parking	X			
Walkways	X			
Curbs, Gutters and Sidewalks	X			
Pavement Markings	X			

Gates and Fencing	X			
Irrigation	X			
Planting	X			
Turf and Grasses	X			
Description	**Site Contractor**	**Modular Contractor**	**Others**	**Comments**

PRE-ENGINEERED MODULAR BUILDINGS

Section 13 34 23
21-32-051

Division 33 – Utilities				
Storm Drains:				
Site	X			
Storm Drain to RWL	X			
Connect RWL to SD	X			
Gas Service:				
Gas Service to Meter Incl. Trenching	X			
Gas Service to Meter	X			
Gas Meter	X			
Gas Line to Buildings	X			
Housekeeping Pad for Gas Meter (if applicable)	X			
Regulator at Buildings	X			
SOV at Buildings		X		
Domestic Water:				
Water Service to Meter Inc. Trenching	X			
Water Service to Meter	X			Coordinate with Modular Contractor
Water Service (From within 5' to buildings)		X		
SOV at Buildings		X		
Connect to Buildings		X		
Chlorination – Site Lines	X			
Chlorination – Building Lines		X		
Sanitary Sewer:				
Site to POC (within 5' of building)	X			
Cleanouts at POC	X			
Connections at Building		X		

MECHANICAL NARRATIVE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Related Documents:
1. Review all contract documents thoroughly prior to bid.
2. Section 13 34 23: Pre-Engineered Modular Buildings
3. Section 13 34 23.01: Pre-Engineered Modular Building
4. Section 13 34 23.03: Electrical Narrative.
5. Products listed are from the District Standards.

1.2 SUMMARY

A Comply with the following design and construction guides/standards:
1. SMACNA: Related to duct construction, support and bracing for all ductwork and piping, seismic bracing, and vibration isolation.
2. ASHRAE 62.1: Ventilation.
3. ASHRAE 55: Thermal comfort design.
4. AABC and NEBB: Testing, Adjusting and Balancing

B. Project Scope:
1. Classrooms to be served by packaged rooftop Heat Pump units, ducted to each space with an overhead mixed air distribution system. Packaged rooftop Heat Pump HVAC is proposed for most of the open building spaces. Carrier LC Series provides a high efficiency rooftop unit available with SEER'S of 15-17; with power exhaust economizers to utilize free cooling for this climate. CO2 monitors will be used for high occupancy spaces such as the Classrooms, and Open Areas to limit excess outside air when the space is operating at less than design occupancy. These units may also be able to be utilized as a single zone variable volume unit for additional energy savings.



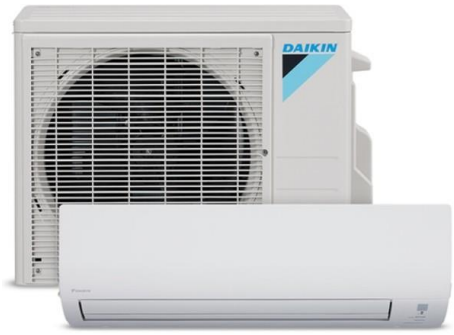
Roof Mounted Heat Pump Unit

2. Restrooms to be ventilated with roof mounted exhaust fans. Basis of Design: Greenheck Corp.



Indoor and Outdoor VRV System Components

3. Electrical and IDF/MDF rooms are to be served with mini-split air conditioning units. Basis of Design: Daikin



MDF Indoor and Outdoor Split-System Components

4. Administrative Offices will be served with: VRF-HR - Variable Refrigerant Volume with Heat Recovery; HVAC system for the office spaces, lobby space, and associated corridor/support spaces shall consist of a Variable Refrigerant Flow Heat Pump split system, with a central outdoor condensing (HP) unit serving multiple indoor fan coil (FC) units. The HP unit shall be mounted on grade. The Staff Room, Conference Rooms and corridor FC units shall be horizontal ducted or ceiling cassette style. The HP & FC system manufacturer's control system shall include an EMCS interface module for tie-in with the district standard energy management controls system. Basis of Design: Daikin.



Indoor and Outdoor VRV System Components

C. Design Criteria:

1. All load calculations shall be completed using computer load simulation software (Trace 700, HAP or equal). The following shall be the conditions.

a. Summer: 105 F dry bulb; 70 F wet bulb
b. Winter: 23 F dry bulb
c. Altitude: 49 ft
d. Indoor Design Conditions: 72 F at 50% RH

D. Internal Load Assumptions: The following internal load assumptions shall be made in the load calculations:

1. Classroom Space:
a. Equipment/Miscellaneous Load: 1.0 watts/SF
b. Lighting Load: 1.2 watts/SF
c. Occupant Load: Per ASHRAE and Title 24
d. Ventilation: Per Title 24
2. Office Spaces:
a. Equipment/Miscellaneous Load: 1.5 watts/SF
b. Lighting Load: 1.0 watts/SF
c. Occupant Load: Per ASHRAE and Title 24
d. Ventilation: Per Title 24
3. Restroom/Support Spaces:
a. Equipment/Miscellaneous Load: 0.2 watts/SF
b. Lighting Load: 0.6 watts/SF
c. Occupant Load: Per ASHRAE and Title 24
d. Ventilation: Per Title 24 (Min. 10 ACH)
4. Electrical Spaces:

a. Equipment Load: Per Electrical Design
b. Miscellaneous Load: 0.2 watts/SF
c. Lighting Load: 0.55 watts/SF
d. Occupant Load: Per ASHRAE and Title 24
e. Ventilation: Per Title 24

E. E. HVAC Equipment:
1. Coordinate equipment locations and sizes with the architect.
2. HVAC Units: Serving Classrooms.
a. System type: Small (4-5 ton) high efficiency packaged heat pumped, DX cooling rooftop units.
b. MERV 13 filters.
c. Single-zone variable air volume.
d. Carrier or Equal.
3. HVAC Units: Serving MDF/IDF Closets.
a. System type: Small (1-2 ton) high efficiency wall mounted mini-split air conditioning units with rooftop condensing units.
b. MERV 13 filters.
c. Constant supply air volume.
d. Daikin or Equal.
4. Exhaust Fans:
a. Roof mounted downblast fans for restrooms.
b. Provide factory wired disconnect, backdraft damper, roof curb and all required accessories.
c. Provide motor starter for fans ¾ horsepower and higher and all three phase fans.
d. Greenheck or Equal.

F. Ductwork and Air Distribution:
1. All ductwork shall meet SMACNA standards for construction and support.
2. The system shall be overhead exposed ducted supply and return.
3. Main ductwork shall be sized with a maximum of 1,200 FPM and 0.08” w.c. per 100 ft.
4. Ductwork shall be designed and constructed to limit losses due to fittings.
5. Acoustic flexible ductwork shall be limited to 5 feet length at individual runouts to diffusers/grilles.
6. Exposed ductwork shall be spiral duct.

G. Energy Management System:
1. New energy management system shall be Alerton to match District Standards.
2. EMS system shall be coordinated with District’s IT personnel.
3. EMS shall be capable the following at a minimum:
a. trending, monitor/alarm, scheduling, setting and adjusting setpoints and optimum start and stop strategies.



Energy Management Control System Components

H. TAB & Commissioning:
1. Provide factory startup for all HVAC equipment.
2. The HVAC systems shall be tested and balance by a qualified third party test and balance company. TAB company shall be certified by NEBB and/or AABC.
3. The mechanical contractor and TAB company shall cooperate fully with the Commissioning Agent to perform all necessary tests and retests.
4. The mechanical contractor shall complete the pre-functional and functional checklists to be included in the commissioning report.
5. Mechanical contractor shall submit all Sequences of Operation to the Commissioning agent.
6. The mechanical contractor shall address to the owner's satisfaction any and all items identified in the issues log as part of the commissioning process.

ELECTRICAL NARRATIVE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Related Documents:
1. Review all contract documents thoroughly prior to bid.
2. Section 13 34 23: Pre-Engineered Modular Buildings
3. Section 13 34 23.01: Pre-Engineered Modular Building
4. Section 13 34 23.02: Mechanical Narrative.
5. Products listed are from the District Standards.

1.2 SUMMARY

A. Work included: Basic Electrical Requirements:
1. Work specified in this Section encompasses products, assemblies, and basic installation methods required for electrical project systems specified under this Division and includes, but is not limited to:
a. Power distribution system.
b. Interior building lighting systems including controls.
c. Egress lighting system.
d. Exterior building and landscape lighting systems including controls.
e. Lighting system branch circuiting.
f. Telecommunication raceway distribution system.

g. Security raceway distribution system and power for equipment.
h. Power wiring and service connections to HVAC and plumbing equipment, etc.
i. Wiring devices and branch circuiting for convenience outlets in building.

B. Work included: Basic Electrical Material and Methods:
1. Work specified in this Section encompasses products, assemblies, and basic installation methods required for electrical project systems specified under this Division and includes, but is not limited to:
a. Raceways.
b. Wires and cables.
c. Outlet, pull, and junction boxes.
d. Wiring devices.
e. Cabinets and enclosures.
f. Grounding and bonding.
g. Supporting devices.
h. Electrical identification

C. Work included: Distribution Switchgear:
1. Work specified in this Section encompasses major components of switchgear required for electrical distribution system specified under this Division and includes, but is not limited to:
a. Main service switchboard and distribution switchboards, including accessories.
b. Disconnect switches.
c. Panelboards.
d. Overcurrent protection devices.
e. Transformers.

D. Work included: Lighting:
1. Provide complete normal and egress lighting system consisting of fixtures, LED drivers, and controls.

E. Work excluded:
1. The following items of work or equipment will be provided under another construction contract, i.e., not in the electrical contract:
a. Sprinkler flow switches and valve monitors (fire protection).
b. Package starter units or integral VFD drives for AC equipment (mechanical).
c. Temperature control wiring for HVAC system (mechanical).
d. Fire/smoke dampers (mechanical).
e. Irrigation controllers and low voltage wiring for control valves (landscape).
f. Door hold open/release devices (hardware).
g. Electric locks for door control (hardware).
h. Telecommunication cabling and devices (Division 27).
i. Security system and devices (Division 28).

F. Reference Standards:
1. Work shall be performed in accordance with all applicable requirements of the latest edition of governing codes, rules, and regulations, including but not limited to the

following minimum standards:

a. CEC California Building Standards Code, Part 3, California Electric Code.
b. CBC California Building Standards Code, Part 2, Basic Building Regulations.
c. CCR California Code of Regulations, Title 24.
d. UBC Uniform Building Code.
e. UFC Uniform Fire Code.
f. UMC Uniform Mechanical Code.

2. Equipment and materials shall conform to the following standards where applicable:

a. ACI American Concrete Institute.
b. ANSI American National Standards Institute.
c. ASTM American Society for Testing Materials.
d. CBM Certified Ballast Manufacturers.
e. ETL Electrical Testing Laboratories.
f. FS Federal Specification.
g. IEEE Institute of Electrical and Electronics Engineers, Inc.
h. IPCEA Insulated Power Cable Engineer Association.
i. NEMA National Electrical Manufacturer's Association.
j. UL Underwriter's Laboratories.

G. Related Work:

1. Miscellaneous metal work: Include fittings, brackets, supports, welding, and pipe as required for raceway and device support and seismic bracing; refer to Division 05.
2. Moisture protection: Include membrane clamps, sheet metal flashing, caulking and sealants, and vapor barriers as required for waterproofing of conduit penetrations through walls and roof; refer to Division 07.

1.3 SUBMITTALS

A Project Record Documents: Provide Project Record Drawings as required herein. Such Drawings shall fully represent installed conditions including actual location of outlets, true panelboard connections following phase balancing routines, correct conduit and wire sizing, as well as routing, revised fixture schedule listing the manufacturer and products actually

installed, and revised panel schedules. A set of DXF files of the electrical drawings will be provided to the Contractor for their use in preparing Record Drawings via an AutoCAD system.

1.4 QUALITY ASSURANCE

A Testing:

1. Tests shall be conducted during the construction period and at completion to determine conformity with applicable codes and with these Specifications. Tests shall be performed in the presence of the engineer and shall include, but not be limited to, the following:

a. Insulation resistance: Perform 600-volt DC tests for one (1) minute on all equipment rated 300 volts and higher, feeder and branch circuit conductors, including the neutral.
b. Circuit continuity: Test all feeder and branch circuits for continuity. Test all neutrals for

improper grounds.

c. Equipment operations: Test motors for correct operation and rotation.

d. Lighting control circuits: Perform operation tests for all lighting circuits controlled.

B. Seismic Bracing: All electrical components shall be installed and braced to conform with California Administrative Codes, Title 21, Title 24 and the Uniform Building Code for Seismic Zone 4.

PART 2 PRODUCTS

2.1 RACEWAYS

A. Minimum conduit size for in-wall and underground applications shall be 0.75 inch. Home run conduits shall be sized to maximum 30 percent fill.

B. Rigid steel conduit (GRS): May be used for feeders and branch circuits, run, exposed on roof.

C. PVC insulated rigid steel conduit (PVC GRS) may be used in the following locations:

1. For feeders and branch circuits in damp or wet locations and where exposed on exterior building walls or roofs.
2. For feeders and branch circuits concealed in concrete walls or slabs in contact with earth.
3. For all below grade penetrations through floor slabs or walls.
4. At transitions from underground PVC when rising up above grade in exposed areas and at utility entrances, use PVC GRS elbows and riser.

D. Intermediate metal conduit (IMC) may be used for the same application as rigid steel conduit.

E. Electrical metallic tubing (EMT) may be used for electrical feeders, interior power and lighting branch circuits, and low tension (telephone and signal) distribution system where run concealed above suspended ceilings, in concrete slabs not in contact with earth, in stud walls, furred spaces, and crawl spaces. All fittings and connectors shall be galvanized steel.

F. Rigid non-metallic conduit (PVC) may be used for any of the following:

1. For feeders and branch circuits run beneath ground floor slab except that bends and penetrations through the floor must be PVC coated rigid steel.
2. For exterior branch circuits in planters and directly buried in earth, 18 inches minimum below grade.
3. PVC may not be run exposed or in concrete walls.
4. Electrical service entrance conduits and telephone service entrance conduits (except that bends must be rigid steel) may be direct burial PVC conduit, 36 inches minimum below grade.

G. Flexible metallic conduit (FMC) may be used in dry locations for connections from

adjacent outlet boxes to motors, transformers, vibrating equipment and machinery, and to lighting fixtures installed in suspended ceilings; minimum sizes shall be 3/8 inch for lighting fixtures and control wiring and 1/2 inch for motor and transformer connections.

H. Liquidtight flexible metallic conduit (LFMC) may be used in damp and wet locations for the same applications as for FMC specified under this Section. Connections to all pump motors, solenoid valves, float switches, flow switches, and similar devices shall be made using liquidtight flexible metallic conduit. Minimum sizes shall be 3/8 inch for lighting fixtures and control wiring and 1/2 inch for motor and transformer connections.

I. Cable tray: Cable tray shall be ladder or solid-bottom type as indicated. Furnish complete to include tray, cover, accessories, fittings, and supports as required. Cable tray shall be NEMA VE 1. Tray and accessories shall be constructed of galvanized steel all welded construction with `C' shaped side rails. Splice plates shall be high strength to allow random location between support members. Supports shall be of the trapeze type and shall be installed on six-foot (6') centers. Cable Tray shall be 12 inches wide with a depth of four inches (4"). Tray shall have 18-inch sweeps.

2.2 WIRE AND CABLE

A. Building Wire:

1. Provide insulated copper conductors for all wires and cables. Use stranded conductors for wire size #8 and greater.
2. Provide minimum AWG #12 for all power and lighting branch circuits. Provide #10 neutral conductor for circuits where two (2) or more phase conductors share a neutral.
3. Use NEC Type THW, THWN, or Type XHHW for feeders and branch circuits in wet or dry locations. Use NEC type THHN for branch circuits in dry locations.
4. Use NEC Type XHHW, rated 90 degrees C in dry locations and 75 degrees C in wet locations, for exterior branch circuit wiring and for circuits served by ground fault interrupting circuit breakers.

B. MC Cable:

1. MC cable shall be an armored assembly of two (2) or more dual rated THHN/THWN conductors and a full sized green insulated ground wire. All conductors shall be stranded. Conductors shall be color-coded for the correct phase and voltage as specified herein. Connectors shall be of the single screw clamp variety with steel or cast malleable iron bodies and threaded male hubs with insulated throats. Fittings shall be UL listed for use with MC cable type specified:

a. Do not utilize MC cable for home runs. Home run wiring shall utilize EMT conduit from a junction box in accessible ceiling space to the panel.
b. Use of MC cable with integral 0-10V wire is acceptable.

2.3 OUTLET, PULL, AND JUNCTION BOXES

A. Four-inch (4") square by 2-1/8-inch minimum sheet metal boxes for interior use.

B. Two-inch (2") wide by three-inch (3") long steel switch boxes, ganged together for multiple

switches.

C. Cast iron outlet or device boxes for outdoor locations.

D. Wiring Devices:
1. Receptacles: 20-amp, 125-volt, duplex, commercial grade, grounding type convenience outlets. Receptacles shall be color as selected by Architect. Provide 20- amp GFCI receptacles in bathrooms, kitchens, and exterior locations where required by code.
2. Switches: 20-amp, 125/277-volt, quiet type specification grade. Switches shall be color as selected by Architect.
3. Cover plates shall be plastic throughout with color as selected by Architect.

E. Cabinets and Enclosures: Construction shall be code gauge galvanized steel with standard concentric knockouts for conduit terminations. Cabinet shall be NEMA 250. Standard gray baked enamel finish. Continuous hinged steel door, lockable, and keyed to match panelboard locks.

2.4 GROUNDING

A. System Description:
1. Provide for the grounding and bonding of all electrical and communication apparatus, machinery, appliances, building components, fittings, and accessories where required to provide a permanent, continuous, low impedance, grounded electrical system.
2. Ground the electrical service system neutral at service entrance equipment.
3. The complete electrical installation including the neutral conductor, metallic conduits and raceways, boxes, cabinets, and equipment shall be completely and effectively grounded in accordance with all code requirements.
4. Provide ground riser for service to all telecommunication rooms.

B. Components:
1. Connections to structural steel, ground rods, or splices:
a. Exothermic welds shall be used for cable-to-cable and cable-to-ground rod and for cable to structural steel surfaces. Exothermic weld kits shall be as manufactured by Cadweld or equal. Each particular type of weld shall use a kit unique to that type of weld.
b. High-pressure compression type connectors shall be used for cable-to- cable and cable-to-ground rod connections. Connections shall be as manufactured by Thomas & Betts #53000 series or equal.
2. Ground conductor: Ground conductor shall be code size Type THW/THWN insulated copper wire, green in color.

C. Requirements:
1. An insulated ground conductor shall be installed in the following:
a. All feeders.
b. All branch circuit wiring runs.
2. Ground busses will be installed in the following areas:
a. All main electrical rooms.
b. All telecommunication closets.

D. Supporting Devices:
1. Expansion-shield type concrete anchors.
2. Pressed galvanized steel, concrete spot insert, with oval slot capable of accepting square or rectangular support nuts of 1/4-inch to 1/2-inch diameter thread for rod support.
3. Steel threaded rod, sized for the load.
4. 1-1/2 inch by 1-1/2 inch 12-gauge galvanized steel construction channel with 17/32-inch diameter bolt holes, 1-1/2 inch on center in the base of the channel.
5. One (1) hole conduit straps of steel or malleable iron with malleable iron clamp-back spacer for surface mounted wall and ceiling applications. Steel channel conduit strap for support from construction channel. Steel conduit hanger for pendant support with threaded rod. Steel wire conduit support strap for support from independent #12-gauge hanger wires.

2.5 IDENTIFICATION

A. Nameplates.

B. Receptacle labels with panel and circuit designations using stick-on tape.

C. Panelboard directories (400 amp or less):
1. Six-inch by eight-inch (6" x 8") circuit directory card with frame and clear plastic covering shall be provided inside the inner panel door.
2. Circuit numbering.

D. Wire and terminal markers.

E. Conductor phase markers.

F. Underground conduit marker.

2.6 MANUFACTURERS: DISTRIBUTION SWITCHGEAR

A. Manufacturers:
1. Eaton Electrical/Cutler-Hammer.
2. Square D.
3. Siemens/I-T-E.
4. General Electric.

2.7 COMPONENTS

A. Switchboards and Distribution Boards:
1. Bolt-on molded case circuit breakers.
2. Copper bus bars.
3. NEMA 3R for exterior applications (main switchboard), NEMA 1 for interior applications.

4. Distribution boards shall be braced and rated to withstand 42 KAIC.

B. Disconnect Switches: Disconnect switches shall be NEMA heavy duty type switch with dead front construction, 240 or 600 VAC rated as applicable, with NEMA 1 enclosure for indoor use and NEMA 3R enclosure for outdoor use.

C. Panelboards:
1. Bolt-on molded case circuit breakers.
2. Copper bus and ground bus.
3. 10,000 AIC minimum rating for 120/208-volt panels.
4. 14,000 AIC minimum rating for 277/480-volt panels.
5. Door-in-door construction.
6. 100 percent neutral bus for 120/208-volt panels.
7. Provide minimum of ten (10) spare breakers or provisions for future breakers in all branch circuit panelboards. Provide at least four (4) spare 0.75-inch MTC into accessible ceiling space for all flush mount panelboards.

D. Circuit Breakers for Branch Circuit Panelboards:
1. Shall be molded case, bolt-on, trip indicating, thermal magnetic type ambient temperature compensated.
2. Breakers shall have toggle, quick make, and quick break operating mechanisms with trip-free feature to prevent contacts being held closed against overcurrent conditions in the circuit.

E. Transformers.

F. Fuses:
1. Fuses shall be supplied for the following services:
a. Motor and equipment fused disconnects.
b. Control and signal circuits.
2. All power fuses shall be current limiting type, Class RK-1 rejection type fuse, Buss Low-Peak LPN-RK (250 VAC), LPS-RK (600 VAC) or equal.

2.8 LIGHTING: LUMINAIRES

A. All fixtures shall have LED light source.

B. Standard lumen output shall meet or exceed the State of California Title 24 Energy Code for high efficiency luminaries.

C. Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.

D. Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management.

E. Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies, and arrays.

F. The finish of all fixtures and trim shall be submitted to and approved by the Architect prior to ordering.

G. All standard fixtures must bear UL label. Attaching of labels after delivery of fixtures is not acceptable.

H. All labels affixed to the fixture shall be in a location not visible from normal viewing angles.

I. Ferrous mounting hardware and accessories shall be finished using either a galvanic or phosphate primer/baked enamel process to prevent corrosion and discoloration of adjacent materials.

J. Fasteners shall be manufactured of galvanized steel.

K. Fixtures shall be free of light leaks and shall be designed to provide sufficient ventilation of LED arrays.

L. All sheet metal work shall be free from tool marks and dents and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. All intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. All surfaces shall be finished so as to eliminate all exposed sharp edges. All mitered corners or joints shall be accurately aligned with abutting intersecting members. Sheet metal work shall be properly fabricated so that planes will not deform (i.e. become concave or convex) due to normal expected ambient and operating conditions.

M. Wiring channels and LED array mountings shall be rigid and accurately constructed.

2.9 LED'S AND DRIVERS

A. Color temperature shall be 3,500K for interior lighting, 3,000K for exterior lighting.

B. Minimum CRI: 80.

C. Minimum life at 70 percent initial lamp lumens: 50,000 hours.

D. Drivers shall be integral to the fixture housing.

2.10 LIGHTING CONTROLS

A. Provide a complete network wireless lighting control system consisting of fixtures with integral controls, wireless dimmer switches, wireless ceiling mounted daylight sensor

and occupancy sensors, and networking components.

B. The lighting control system shall provide sensor-based (occupancy, daylighting), and manual (on/off, dimming) lighting control. Exterior lighting will be controlled by time-based component of the system.

C. The system shall not require any centrally hardwired switching equipment.

D. The system shall be capable of wireless, wired, or hybrid wireless/wired architectures.

E. Space Control Requirements:

1. Unless otherwise noted on the plans, provide a minimum application of lighting controls as follows:

a. Provide occupancy/vacancy sensors with manual or partial ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and automatic ON occupancy sensors are more appropriate. Provide manual ON occupancy sensors for any enclosed office, conference room, meeting room, or classroom. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling or corner- mounted sensors and manual ON switches.

b. Daylit areas:

1) Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by the 2016 Building Energy Efficiency Standards:

a) All luminaires within each code-defined primary and secondary daylight zone or skylit zone shall be controlled separately from luminaires.

b) Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in

compliance with relevant local building energy codes.

c) Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.

d) Provide smooth and continuous daylight dimming for areas marked on Drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

END OF DIVISION 13 34 23.03

BASIC PLUMBING
MATERIALS AND METHODS

Section 22 00 50
21-32-051

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Electric motors.
2. Gauges.
3. Access Doors.
4. Flexible joints.
5. Insulation.

1.02 RELATED REQUIREMENTS

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

B. This Section is a part of each Division 22 Section.

1.03 ADDITIONAL REQUIREMENTS

A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.

B. Make all temporary connections required to maintain services during the course of this Contract without additional cost to the Owner. Notify the Owner seven days in advance before disturbing any service.

C. Plumbing work done under this contract shall not adversely affect the operation of the existing plumbing systems.

1.04 REFERENCES AND STANDARDS

A. Where material or equipment is specified to conform to referenced standards, it shall be assumed that the most recent edition of the standard in effect at the time of bid shall be used.

1. CSA – Canadian Standards Association International.
2. ANSI - American National Standards Institute.
3. ASTM - American Society for Testing and Materials.
4. CCR - California Code of Regulations.

a. Title 8 - Division of Industrial Safety, Subchapter 7; General Industry Safety Orders, Articles 31 through 36.

5. NCPWB - National Certified Pipe Welding Bureau.

6. CEC - California Electrical Code.

7. NEMA - National Electrical Manufacturers' Association.

8. NFPA - National Fire Protection Association.

9. OSHA - Occupational Safety and Health Act.

10. UL - Underwriters' Laboratories, Inc.

B. Requirements of Regulatory Agencies:

1. The publications listed below form part of this specification; comply with provisions of these publications except as otherwise shown or specified.

a. California Building Code, 2019.

b. California Electrical Code, 2019.

c. California Energy Code, 2019.

d. California Fire Code, 2019.

e. California Green Building Standards Code, 2019.

f. California Mechanical Code, 2019.

g. California Plumbing Code, 2019.

h. California Code of Regulations, Title 24.

i. California Health and Safety Code.

j. CAL-OSHA.

k. California State Fire Marshal, Title 19 CCR.

l. National Fire Protection Association.

m. Occupational Safety and Health Administration.

n. Other applicable state laws.

2. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes, or to requirements of authorities having jurisdiction. It is

not the intent of Drawings or specifications to repeat requirements of codes except where necessary for clarity.

1.05 DRAWINGS

A. Examine Contract Documents prior to bidding of work and report discrepancies in writing to Architect.

B. Drawings showing location of equipment and materials are diagrammatic and job conditions will not always permit installation in location shown. The Plumbing Drawings show general arrangement of equipment and materials, etc., and shall be followed as closely as existing conditions, actual building construction, and work of other trades permit.

1. Architectural and Structural Drawings shall be considered part of the Work. These Drawings furnish Contractor with information relating to design and construction of the Project. Architectural Drawings take precedence over Plumbing Drawings.

2. Because of the small scale of Plumbing Drawings, not all offsets, fittings, and accessories required are shown. Investigate structural and finish conditions affecting the Work and arrange Work accordingly. Provide offsets, fittings, and accessories required to meet conditions. Inform Architect immediately when job conditions do not permit installation of equipment and materials in the locations shown. Obtain the Architects approval prior to relocation of equipment and materials.

3. Relocate equipment and materials installed without prior approval of the Architect. Remove and relocate equipment and materials at Contactors' expense upon Architects' direction.

4. Minor changes in locations of equipment, piping, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.

C. Execute work mentioned in Specifications and not shown on Drawings, or vice versa, the same as if specifically mentioned or shown in both.

1.06 FEES AND PERMITS

A. Obtain and pay for all permits and service required in installation of this work; arrange for required inspections and secure approvals from authorities having jurisdiction. Comply with requirements of Division 01.

B. Arrange for utility connections and pay charges incurred, including excess service charges.

1. Bear the cost of construction related to utility services, from point of connection to utility services shown on Contract Documents. This includes piping, excavation, backfill, meters, boxes, check valves, backflow prevention devices, general service valves, concrete work, and the like, whether or not Work is performed by Contractor,

local water/sanitation district, public utility, other governmental agencies or agencies' assigns.

C. Coordination:

1. General:

a. Coordinate plumbing Work with trades covered in other Specifications Sections to provide a complete, operable and sanitary installation of the highest quality workmanship.

2. Electrical Coordination:

a. Refer to the Electrical Drawings and Specifications, Division 26, for service voltage and power feed wiring for equipment specified under this section. Contractor has full responsibility for the following items of work:

1) Review the Electrical Drawings and Division 26 Specifications to verify that electrical services provided are adequate and compatible with equipment requirements.

2) If additional electrical services are required above that indicated on Electrical Drawings and in Division 26, such as more control interlock conductors, larger feeder, or separate 120 volt control power source, include cost to furnish and install additional electrical services as part of the bid.

3) Prior to proceeding with installation of additional electrical work, submit detailed drawings indicating exact scope of additional electrical work.

3. Mechanical Coordination:

a. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to accommodate mechanical system installation.

b. Coordinate installation of supporting devices. Set sleeves in poured-in-place concrete and other structural components during progress of construction.

c. Coordinate requirements for access panels and doors for mechanical items requiring access where concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

d. Coordinate with other trades equipment locations, pipe, duct and conduit runs, electrical outlets and fixtures, air inlets and outlets, and structural and architectural features. Provide information on location of piping and seismic bracing to other trades as required for a completely coordinated project.

1.07 SUBMITTALS - GENERAL

A. Refer to Division 01 Submittals Section(s) for additional requirements.

B. Submittal packages may be submitted via email as PDF electronic files, or as printed packages. PDFs shall be legible at actual size (100 percent). Provide seven copies of printed submittal packages.

C. Provide submittal of materials proposed for use as part of this Project. Product names in Specifications and on Drawings are used as standards of quality. Furnish standard items on specified equipment at no extra cost to the Contract regardless of disposition of submittal data. Other materials or methods shall not be used unless approved in writing by Architect. Architect's review will be required even though "or equal" or synonymous terms are used.

1. Partial or incomplete submittals will not be considered.

2. Quantities are Contractor's responsibility and will not be reviewed.

3. Provide materials of the same brand or manufacturer for each class of equipment or material.

4. Identify each item by manufacturer, brand, trade name, number, size, rating, or other data necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.

5. Identify each submittal item by reference to items' Specification Section number and paragraph, by Drawing and detail number, and by unit tag number.

6. Organize submittals in same sequence as in Specification Sections.

7. Show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, and weight.

    a. Submit Shop Drawings, performance curves, and other pertinent data, showing size and capacity of proposed materials.

    b. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of Contract Documents.

    c. Drawings shall be drawn to scale and dimensioned (except schematic diagrams). Drawings may be prepared by vendor but must be submitted as instruments of Contractor, thoroughly checked and signed by Contractor before submission to Architect for review.

    d. Catalog cuts and published material may be included with supplemental scaled drawings.

D. Review of submittals will be only for general conformance with design concept and general compliance with information given in Contract Documents. Review will not include quantities, dimensions, weights or gauges, fabrication processes, construction methods,

coordination with work of other trades, or construction safety precautions, which are sole responsibility of Contractor. Review of a component of an assembly does not indicate acceptance of an assembly. Deviations from Contract Documents not clearly identified by Contractor are Contractor's responsibility and will not be reviewed by Architect.

E. Within reasonable time after award of contract and in ample time to avoid delay of construction, submit to Architect Shop Drawings or submittals on all items of equipment and materials provided. Provide submittal in at least seven copies and in complete package.

1. Shop Drawings and submittals shall include Specification Section, Paragraph number, and Drawing unit symbol or detail number for reference. Organize submittals into booklets for each Specification section and submit in loose-leaf binders with index. Deviations from the Contract Documents shall be prominently displayed in the front of the submittal package and referenced to the applicable Contract requirement.

F. Furnish to the Project Inspector complete installation instructions on material and equipment before starting installation.

1.08 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing systems materials and products.

B. Shop Drawings.

C. Sustainable Design Submittals:

1. Product Data: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.

2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.

D. Pipe, pipe or plumbing fittings, fixtures, solder and flux installed in a system providing water for human consumption shall comply with lead free requirements of the California Health and Safety Code Section 11 68 75. Provide submittal information for products third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

E. Delegated-Design Submittals: For seismic supports, anchorages, restraints, and vibration isolators indicated to comply with performance requirements and design criteria.

1. Calculations performed for use in selection of seismic supports, anchorages, and restraints shall utilize criteria indicated in Structural Contract Documents.

2. Include design calculations and details for selecting vibration isolators and vibration isolation bases complying with performance requirements, design criteria, and

analysis data signed and sealed by the California registered structural engineer responsible for their preparation.

3. Supports, anchorages and restraints for piping, ductwork, and equipment shall be an OSHPD pre-approved system such as TOLCO, ISAT, Mason, or equal. Pipes, ducts and equipment shall be seismically restrained in accordance with requirements of current edition of California Building Code. System shall have current OPM number and shall meet additional requirements of authority having jurisdiction. Provide supporting documentation required by the reviewing authority and the Architect and Engineer. Provide layout drawings showing piping, ductwork and restraint locations.

    a. Bracing of Piping and Equipment: Specifically state how bracing attachment to structure is accomplished. Provide shop drawings indicating seismic restraints, including details of anchorage to building. In-line equipment must be braced independently of piping, and in conformance with applicable building codes. Provide calculations to show that pre-approval numbers have been correctly applied in accordance with general information notes of pre-approval documentation. Gas pipe bracing shall be designed in accordance with California Building Code Section 1615A.1.22 and ASCE 7-10 Section 13.6. Coefficient I_p = 1.5 shall be used for gas piping bracing calculations.

    b. In lieu of the above or for non-standard installations not covered in the above pre-approved systems, Contractor shall provide layout drawings showing piping, ductwork, and restraint locations, and detail supports, attachments and restraints, and furnish supporting calculations and legible details sealed by a California registered structural engineer, in accordance with 2019 California Building Code

4. Additional Requirements: In addition to the above, conform to all state and local requirements.

1.09 INFORMATIONAL SUBMITTALS

A. Provide layouts for plumbing systems, for inclusion in coordinated layout specified in Section 23 80 00. Comply with requirements for layouts specified in Section 23 80 00.

1.10 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Refer to Division 01 for complete instructions.

2. Furnish three complete sets of Operation and Maintenance Manual bound in hardboard binder, and one compact disc containing complete Operation and Maintenance Manual in searchable PDF format. Provide Table of Contents. Provide index tabs for each piece of equipment in binder and disc. Begin compiling data upon approval of submittals.

    a. Sets shall incorporate the following:

1) Product Data.

2) Shop Drawings.

3) Record Drawings.

4) Service telephone number, address and contact person for each category of equipment or system.

5) Complete operating and maintenance instructions for each item of plumbing equipment and systems.

6) Copies of guarantees/warrantees for each item of equipment and systems.

7) Test data and system balancing reports.

8) Typewritten maintenance instructions for each item of equipment listing lubricants to be used, frequency of lubrication, inspections required, adjustment, etc.

9) Manufacturers' bulletins with parts numbers, instructions, etc., for each item of equipment.

10) Control diagrams and literature.

11) A complete list or schedule of all scheduled valves giving the number of the valve, location and the rooms or area controlled by the valve. Identify each valve with a permanently attached metal tag stamped with number to match schedule. Post list in frame under plastic on wall in mechanical room or where directed by Architect.

12) Check test and start reports for each piece of plumbing equipment provided as part of the Work.

13) Commissioning and Preliminary Operation Tests required as part of the Work.

b. Post service telephone numbers and/or addresses in an appropriate place as designated by the Architect.

B. Record Drawings:

1. Refer to Division 01, Record Documents, for requirements governing Work specified herein.

2. Upon completion of the work, deliver to Architect the following:

a. Originals of drawings showing the Work exactly as installed.

b. One complete set of reproducible drawings showing the Work exactly as installed.

c. One compact disc with complete set of drawings in PDF format showing the Work exactly as installed.

d. Provide Contractor's signature, verifying accuracy of record drawings.

e. Obtain the signature of the Project Inspector for all record drawings.

1.11 SUBSTITUTIONS

A. Refer to Division 01 for complete instructions. Requirements given below are in addition to or are intended to amplify Division 01 requirements. In the case of conflict between requirements given herein and those of Division 01, Division 01 requirements shall apply.

B. It is the responsibility of Contractor to assume costs incurred because of additional work and or changes required to incorporate proposed substitute into the Project. Refer to Division 01 for complete instructions.

C. Substitutions will be interpreted to be all manufacturers other than those specifically listed in the Contract Documents by brand name, model or catalog number.

D. Only one request for substitution will be considered for each item of equipment or material.

E. Substitution requests shall include the following:

1. Reason for substitution request.

2. Complete submittal information as described herein; see "Submittals."

3. Coordinated scale layout drawings depicting position of substituted equipment in relation to other work, with required clearances for operation, maintenance and replacement.

4. List optional features required for substituted equipment to meet functional requirements of the system as indicated in Contract Documents.

5. Explanation of impact on connected utilities.

6. Explanation of impact on structural supports.

F. Installation of reviewed substitution is the Contractors' responsibility. Any mechanical, electrical, structural, or other changes required for installation of reviewed substituted equipment or material must be made by the Contractor without additional cost to the Owner. Review by the Architect of the substituted equipment or material, including dimensioned Drawings will not waive these requirements.

G. Contractor may be required to compensate the Architect for costs related to substituted equipment or material.

1.12 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with plumbing systems work similar to that required for this Project.

C. California Health and Safety Code Compliance: For products covered under the scope of HSC 116875 for potable water service. Products for potable water service shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

D. Comply with applicable portions of California Plumbing Code pertaining to selection and installation of plumbing materials and products.

E. All materials and products shall be new and shall match existing.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Protect equipment and piping delivered to Project site from weather, humidity and temperature variations, dirt, dust and other contaminants.

1.14 FIELD CONDITIONS

A. Contractor shall visit Project site and examine existing conditions in order to become familiar with Project scope. Verify dimensions shown on Drawings at Project site. Bring discrepancies to the attention of Architect. Failure to examine Project site shall not constitute basis for claims for additional work because of lack of knowledge or location of hidden conditions that affect Project scope.

B. Information on Drawings relative to existing conditions is approximate. Deviations from Drawings necessary during progress of construction to conform to actual conditions shall be approved by the Architect and shall be made without additional cost to the Owner. The Contractor shall be held responsible for damage caused to existing services. Promptly notify the Architect if services are found which are not shown on Drawings.

1.15 WARRANTY

A. Refer to Division 01 for warranty requirements, and duration and effective date of Contractor’s Standard Guarantee.

B. Repair or replace defective work, material, or part that appears within the warranty period, including damage caused by leaks.

C. On failure to comply with the warranty requirements within a reasonable length of time after notification is given, the Architect/Owner shall have the repairs made at the Contractor's expense.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials or equipment of the same type shall be of the same brand wherever possible. All materials shall be new and in first class condition.

B. All sizes, capacities, and efficiency ratings shown are minimum, except that gas capacity is maximum available.

C. Refer to Sections 22 10 00 and 23 80 00 for specific system piping materials.

2.02 MATERIALS AND PRODUCTS

A. No material installed as part of this Work shall contain asbestos.

B. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.03 GAUGES

A. Marsh "Series J", U.S. Gage, Danton 800, or equal, with bronze bushed movement and front recalibration. Dials shall be white with black numerals, 3-1/2 inch dial face. Normal reading shall be at mid-scale. Provide a needle valve on each gauge connection. Supply a gauge piped with branch isolation valves across the inlet and outlet of each pump and where shown on the Drawings.

B. Provide Pete's Plug II, Sisco P/T, or equal, test plug with Nordel core {and gasketed cap}, on inlet and outlet of each coil, boiler, condenser, chiller and heat exchanger and where shown on Drawings.

2.04 ACCESS DOORS

A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.

1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.

B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.

C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.

D. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.

E. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.

F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:

1. Milcor

a. Style K (plaster).

b. Style DW (gypsum board).

c. Style M (Masonry).

d. Style "Fire Rated" where required.

2.05 EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

2.06 PIPE IDENTIFICATION

A. Identify each piping system and indicate the direction of flow by means of Seton, Inc., Marking Services Inc., Reef Industries, Inc., or equal, pre-tensioned, coiled semi-rigid plastic pipe labels formed to circumference of pipe, requiring no fasteners or adhesive for attachment to pipe.

B. The legends and flow arrows shall conform to ASME A13.1.

2.07 INSULATION WORK

A. General:

1. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.

3. The term "piping" used herein includes pipe, valves, strainers and fittings.

4. Apply insulating cement to fittings, valves and strainers and trowel smooth to the thickness of adjacent covering. Cover with jacket to match piping. Extend covering on valves up to the bonnet. Leave strainer cleanout plugs accessible.

5. Provide pre-formed PVC valve and fitting covers.

6. Provide Calcium Silicate rigid insulation and sheet metal sleeve, 18 inch minimum length at each pipe hanger. Seal ends of insulation to make vapor tight with jacket.

7. Test insulation, jackets and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723 or ASTM E84.

8. Clean thoroughly, test and have approved, all piping and equipment before installing insulation and/or covering.

9. Repair all damage to existing pipe and equipment insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.

B. Insulation of Piping:

1. Insulate domestic hot and tempered water with minimum 3-1/2 pounds per cubic foot density fiberglass with ASJ-SSL jacket. Insulation thickness shall be the following:

   a. Pipe 3/4 inches and smaller: 1 inch thick.

   b. Pipe 1 inch through 1-1/2 inches: 1-1/2 inches thick.

   c. Pipe 2 inches and larger: 2 inches thick.

2. Insulate domestic hot water piping under slab on grade and cold water piping exposed to the weather with 3/4 inch thick Therma-Cel, Armaflex, or equal; seal water tight per manufacturer's directions.

3. Insulate roof drain and overflow drain bodies, horizontal sections of rainwater leader piping and overflow piping, and condensate drains within the building envelope with 1 inch thick fiberglass, minimum 3-1/2 pound per cubic foot density, with ASJ-SSL jacket.

4. Insulate domestic cold water piping outside of insulation envelope in outside walls, vented attic spaces, and unheated spaces, including equipment rooms and below raised floor with 1 inch thick molded fiberglass, minimum 3-1/2 pound per cubic foot density, with ASJ-SSL jacket.

5. Exposed insulated piping within the building shall have a Zeston 2000 25/50, Proto Lo-Smoke, or equal, PVC jacket and fitting cover installed over the insulation, applied per manufacturer's instructions. Insulation shall be vapor tight before applying PVC jacket and fitting covers. Verify suitability with manufacturer of insulation. Insulation with pre-applied polymer jacket may be substituted at Contractor’s option.

6. Insulate condensate drain piping in freezer with 3/4 inch thick Therma-Cel, Armaflex, or equal. Seal water tight per manufacturer's directions. Install heat tape prior to insulation of piping, in accordance with manufacturer's directions.

7. Where insulated piping is exposed to the weather apply aluminum jacket secured with 1/2 inch stainless-steel bands on 12 inch centers. Insulation shall be vapor tight before applying metal jacket, and aluminum fitting covers. Install jacketing with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Cover fittings with glass cloth, two coats of Foster Sealfas 30-36, and factory-fabricated aluminum fitting covers, of same material, finish, and thickness as jacket. Insulation shall be vapor tight before applying metal jacket and fitting covers.

    a. Fitting covers:

        1) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.

        2) Tee covers.

        3) Flange and union covers.

        4) End caps.

        5) Beveled collars.

        6) Valve covers.

        7) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

    b. Jacket thickness:

        1) Pipes 10 inches diameter and smaller: Minimum .016 inch thick jacket with smooth finish.

        2) Pipes 12 inches diameter and larger: Minimum .020 inch thick jacket with smooth finish.

PART 3 - EXECUTION

3.01 EXISTING MATERIALS

A. Remove existing equipment, piping, wiring, construction, etc., which interferes with Work of this Contract. Promptly return to service upon completion of work in the area. Replace items damaged by Contractor with new material to match existing.

B. Removed materials which will not be re-installed and which are not claimed by Owner shall become property of Contractor and shall be removed from Project site. Consult Owner

before removing any material from Project site. Carefully remove materials claimed by Owner to prevent damage and deliver to Owner-designated storage location.

C. Existing piping and wiring not reused and are concealed in building construction may be abandoned in place and all ends shall be capped or plugged. Remove unused piping and wiring exposed in Equipment Rooms or occupied spaces. Material shall be removed from Project premises. Disconnect power, water, gas, pump or any other active energy source from piping or electrical service prior to abandoning in place.

D. Existing piping, ductwork, and equipment modified or altered as part of this Work shall comply with the most recent applicable code requirements.

3.02 FRAMING, CUTTING AND PATCHING

A. Special framing, recesses, chases and backing for Work of this Section, unless otherwise specified, are covered under other Specification Sections.

B. Contractor is responsible for placement of pipe sleeves, hangers, inserts, supports, and location of openings for the Work.

C. Cutting, patching, and repairing of existing construction to permit installation of equipment, and materials is the responsibility of Contractor. Repair or replace damage to existing work with skilled mechanics for each trade.

D. Cut existing concrete construction with a concrete saw. Do not utilize pneumatic devices.

E. Core openings through existing construction for passage of new piping and conduits. Cut holes of minimum diameter to suit size of pipe and associated insulation installed. Coordinate with building structure, and obtain Structural Engineer's approval prior to coring through existing construction.

3.03 PLUMBING DEMOLITION

A. Refer to Division 01 Sections “Cutting and Patching” and “Selective Demolition” for general demolition requirements and procedures.

B. Disconnect, dismantle and remove mechanical systems, equipment, and components indicated to be removed. Coordinate with all other trades.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping to remain with same or compatible piping material. Refrigerant system must be evacuated per EPA requirements.

3. Equipment to Be Removed: Drain down and cap remaining services and remove equipment.

4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.04 ELECTRICAL REQUIREMENTS

A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.

B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIR with factory-wired strip heaters in each starter enclosure and temperature control panel where required to inhibit condensation.

C. All line voltage and low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.05 PIPING SYSTEM REQUIREMENTS

A. Drawing plans, schematic and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

3.06 PRIMING AND PAINTING

A. Perform priming and painting on the equipment and materials as specified herein.

B. See Division 09 Painting Section(s) for detailed requirements.

C. Priming and Painting:

1. Exposed ferrous metals, including piping, which are not galvanized or factory-finished shall be primed and painted.

a. Black Steel Piping:

1) Primer: One coat gray Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, comparable products by Rust-Oleum, Kelly Moore, or equal.

2) Topcoat: Two coats gray Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane Enamel, comparable products by Rust-Oleum, Kelly Moore, or equal.

2. Metal surfaces of items to be jacketed or insulated except piping shall be given two coats of primer unless furnished with equivalent factory finish. Items to be primed shall be properly cleaned by effective means free of rust, dirt, scale, grease and other deleterious matter and then primed with the best available grade of zinc rich primer. After erection or installation, all primed surfaces shall be properly cleaned of any foreign or deleterious matter that might impair proper bonding of subsequent paint coatings. Any abrasion or other damage to the shop or field prime coat shall be properly repaired and touched up with the same material used for the original priming.

3. Where equipment is provided with nameplate data, the nameplate shall be masked off prior to painting. When painting is completed, remove masking material.

3.07 EXCAVATING

A. Perform all excavating required for work of this Section. Provide the services of a pipe/cable locating service prior to excavating activities to determine location of existing utilities.

B. Unless shown otherwise, provide a minimum of 2'-6" cover above top of pipe to finished grade for all service piping, unless otherwise noted. Trim trench bottom by hand or provide a 4 inch deep minimum bed of sand to provide a uniform grade and firm support throughout entire length of pipe. For all PVC pipe and for PE gas pipe, bed the pipe in 4 inch sand bed. Pipe bedding materials should be clean crushed rock, gravel or sand of which 100 percent will pass a 1 inch sieve. For pipes that are larger than 10 inches in diameter, at least 95 percent should pass a 3/4 inch sieve, and for pipes 10 inches in diameter or smaller, 100 percent should pass a 1/2 inch sieve. All other materials should have a minimum sand equivalent of 50. Only a small proportion of the native soils will meet these requirements without extensive processing; therefore, importation of pipe bedding materials should be anticipated. Pipe bedding materials shall be compacted in lifts not exceeding 6 inches in compacted thickness. Each lift shall be compacted to not less than 90 percent relative compaction at or above the optimum moisture content, in accordance with ASTM Specification D2940, except that bedding materials graded such that 100 percent of the material will pass a No. 200 sieve shall be compacted in 6 inch lifts using a single pass of a flat-plate, vibratory compactor or vibratory drum. Pipe bedding materials should extend at least to the spring line.

C. Maintain all warning signs, barricades, flares, and red lanterns as required.

D. For all trenches 5 feet or more in depth, submit copy of permit detailed drawings showing shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trenches. Obtain a permit from the

Division of Industrial Safety prior to beginning excavations. A copy of the permit shall be available at the site at all times.

3.08 BACKFILLING

A. Backfill shall comply with applicable provisions of Division 31 of these Specifications.

B. Except under existing or proposed paved areas, walks, roads, or similar surfaces, backfill for other types of pipe shall be made using suitable excavated material or other approved material. Place backfill in 8 inch layers, measured before compaction, and compact with impact hammer to at least 90 percent relative compaction per ASTM D2940.

1. Backfill plastic pipe and insulated pipe with sand for a minimum distance of 12 inches above the top of the pipe. Compact using mechanical tamping equipment.

C. Entire backfill for excavations under existing or proposed pavements, walks, roads, or similar surfaces, under new slabs on grade, shall be made with clean sand compacted with mechanical tamping equipment vibrator to at least 90 percent relative compaction per ASTM D2940. Remove excess earth. Increase the minimum compaction within the uppermost two feet of backfill to 95 percent.

D. Replace or repair to its original condition all sod, concrete, asphalt paving, or other materials disturbed by the trenching operation. Repair within the guarantee period as required.

3.09 PIPING SYSTEMS INSTALLATION

A. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately. Do not allow piping systems to be pressurized without written consent of the Architect.

B. General:

1. All piping shall be concealed unless shown or otherwise directed. Allow sufficient space for ceiling panel removal.

2. Installation of piping shall be made with appropriate fittings. Bending of piping will not be accepted.

3. Install piping to permit application of insulation and to allow valve servicing.

4. Where piping or conduit is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.

5. Horizontal runs of pipes and/or electrical conduit suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.

6. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.

7. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.

8. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.

9. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.

10. Install horizontal valves with valve stem above horizontal.

11. Use reducing fittings; bushings shall not be allowed. Use eccentric reducing fittings wherever necessary to provide free drainage of lines and passage of air.

12. Verify final equipment locations for roughing-in.

13. Service Markers: Mark the location of each plugged or capped pipe with a 4 inch round by 30 inch long concrete marker, set flush with finish grade. Provide 2-1/2 inch diameter engraved brass plate as part of monument marker.

14. Furnish and install anchors or thrust blocks on PVC water lines in the ground, at all changes in direction of piping, and at all connections or branches from mains 1-1/2 inch and larger. Form anchors or thrust blocks by pouring concrete between pipe and trench wall. Thrust blocks shall be of adequate size and so placed as to take thrusts created by maximum internal water pressure. Sizing and placement shall be per manufacturer's recommendations, CPC, and IAPMO installation standards. Anchor piping to building construction.

15. Sanitary Sewer and Storm Drain: Grade piping inside building uniformly 1/4 inch per foot if possible but not less than 1/8 inch per foot. Run piping as straight as possible. Make piping connections between building piping and outside service pipe with cast iron reducers or increasers. Slope sewers uniformly between given elevations where invert elevations are shown.

16. Where piping is installed in walls within one inch of the face of stud, provide a 16 gauge sheet metal shield plate on the face of the stud. The shield plate shall extend a minimum of 1-1/2 inches beyond the outside diameter of the pipe.

C. Floor, Wall, and Ceiling Plates:

1. Fit all pipes with or without insulation passing through walls, floors, or ceilings, and all hanger rods penetrating finished ceilings with chrome-plated or stainless escutcheon plates.

D. Firestopping:

1. Pack the annular space between the pipe sleeves and the pipe through all floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.

    a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.

2. Provide SpecSeal Systems UL fire rated sleeve/coupling penetrators for each pipe penetration or fixture opening passing through floors, walls, partitions or floor/ceiling assemblies. All Penetrators shall comply with UL Fire Resistance Directory (Latest Edition), and in accordance with Chapter 7, CBC requirements.

3. Sleeve penetrators shall have a built in anchor ring for waterproofing and anchoring into concrete pours or use the special fit cored hole penetrator for cored holes.

4. Copper and steel piping shall have SpecSeal plugs on both sides of the penetrator to reduce noise and to provide waterproofing.

5. All above Systems to be installed in strict accordance with manufacturer's instructions.

6. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

E. Flashing:

1. Flashing for penetrations of metal or membrane roof for mechanical items such as flues and pipes shall be coordinated with the roofing manufacturer and roofing installer for the specific roofing type. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.

    a. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.

    b. Furnish and install counterflashing above each flashing required. Provide Stoneman, or equal, vandalproof top and flashing combination. Provide vandalproof top for each plumbing vent through roof. Elmdor/Stoneman Model 1540, 1550, 1570, or equal.

2. For all other types of roofing system, furnish and install around each pipe, where it passes through roof, a flashing and counterflashing. All flashing shall be made of four pound seamless sheet lead with 6 inch minimum skirt and steel reinforced boot. Counterflashing shall be cast iron. For vents, provide vandalproof top and flashing combination. Elmdor/Stoneman Model 1100-4, 1100-5, 1100-7, or equal.

F. Hangers and Supports:

1. General: Support equipment and piping so that it is firmly held in place by approved iron hangers and supports and special hangers. Hanger and support components shall support weight of equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. Rigidly fasten hose faucets, fixture stops, compressed air outlets, and similar items to the building construction. The Architect shall approve hanger material before installation. Do not support piping with plumbers' tape, wire rope, wood, or other makeshift devices. Where building structural members do not match piping support spacing, provide “bridging” support members firmly attached to building structural members in a fashion approved by the structural engineer.

    a. Materials, design, and type numbers per Manufacturers' Standardization Society (MSS), Standard Practice (SP)-58.

        1) Provide copper-plated or felt-lined hangers for use on copper tubing.

2. Hanger components shall be provided by one manufacturer: B-Line, Grinnell, Unistrut, Badger, or equal.

3. Riser clamps: B-line model B3373, or equal.

4. Pipe Hanger and Support Placement and Spacing:

    a. Vertical piping support spacing: Provide riser clamps for piping, above each floor, in contact with the floor. Provide support at joints, branches, and horizontal offsets. Provide additional support for vertical piping, spaced at or within the following maximum limits:

Pipe Diameter	Steel Threaded or Welded (Note 3)	Steel Gas	Copper Brazed or Soldered (Note 3)	CPVC & PVC (Note 2)
1/2 - 1”	12 ft.	6 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)
1-1/4 - 2”	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft..	Base and Each Floor (Note 1)
2-1/2 - 3”	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)

Over 4”	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)

1) Note 1: Provide mid-story guides.

2) Note 2: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.

3) Note 3: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.

b. Vertical cast iron piping support spacing: Base and each floor not to exceed 15 feet.

c. Horizontal piping, hanger and support spacing: Locate hangers and supports at each change of direction, within one foot of elbow, and spaced at or within following maximum limits:

Pipe Diameter	Steel Threaded or Welded (Note 2)	Steel Gas	Copper Brazed or Soldered (Notes 2, 3)	CPVC & PVC (Note 1)
1/2 - 1"	6 ft.	6 ft.	5 ft.	3 ft.
1-1/4 - 2"	7 ft.	10 ft.	6 ft.	4 ft.
2-1/2 - 3"	10 ft.	10 ft.	10 ft.	4 ft.
Over 4"	10 ft.	10 ft.	10 ft.	4 ft.

1) Note 1: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.

2) Note 2: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.

3) Note 3: Includes all refrigerant piping, including vapor and hot gas pipes.

d. Horizontal cast iron piping support spacing:

1) Support piping at every other joint for piping length of less than 4 feet.

2) For piping longer than 4 feet, provide support on each side of the coupling, within 18 inches of each joint.

3) Hanger shall not be installed on the coupling.

4) Provide support at each horizontal branch connection.

5) Provide sway brace at 40 foot maximum spacing for suspended pipe with no-hub joints, except where a lesser spacing is required by the seismic design criteria used in delegated design for seismic systems. Refer to Article, Submittals.

6) Provide a brace on each side of a change in direction of 90 degrees or more.

5. Suspended Piping:

a. Individually suspended piping: B-Line B3690 J-Hanger or B3100 Clevis, complete with threaded rod, or equal. All hangers on supply and return piping handling heating hot water or steam shall have a swing connector at point of support.

Pipe Size	Rod Size Diameter
2" and Smaller	3/8"
2-1/2" to 3-1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

b. Provide 3/8 inch rod for support of PVC and CPVC and provide continuous support.

c. Trapeze Suspension: B-Line 1-5/8 inch width channel in accordance with manufacturer's published load ratings. No deflection to exceed 1/180 of a span.

d. Trapeze Supporting Rods: Shall have a safety factor of five; securely anchor to building structure.

e. Pipe Clamps and Straps: B-Line B2000, B2400; isolate copper pipe with two thicknesses of 2 inches wide 10-mil polyvinyl tape. Where used for seismic support systems, provide B-Line B2400 series pipe straps.

f. Concrete Inserts: B-line B22-I continuous insert or B2500 spot insert. Do not use actuated fasteners for support of overhead piping unless approved by Architect.

g. Steel Connectors: Beam clamps with retainers.

6. Support to Structure:

a. Wood Structure: Provide and install wood blocking as required to suit structure. Provide lag screws or through bolts with length to suit requirements, and with size (diameter) to match the size of hanger rods required.

1) Do not install Lag screws in tension without written review and acceptance by Structural Engineer.

Side Beam Angle Clip	B-Line B3062 MSS Type 34
Side Beam Angle Clip	B-Line B3060
Ceiling Flange	B-Line B3199

2) Blocking for support of piping shall be not less than 2 inch thick for piping up to 2 inch size. Provide 3 inch blocking for piping up through 5 inch size, and 4 inch blocking for larger piping. Provide support for blocking in accordance with Structural Engineers requirements.

3) Where lag screws are used, length of screw shall be 1/2 inch less than the wood blocking. Pre-drill starter holes for each lag screw.

7. Rubber Neoprene Pipe Isolators:

a. Pipe isolators shall comprise an internal rubber or neoprene material that isolates pipe from hanger and structure. Install at all piping located in acoustical walls. Refer to Architectural Drawings for location of acoustical walls.

b. Isolation material shall be either a rubber or neoprene material that prevents contact between the pipe and the structure. The rubber shall have between a 45 to 55 durometer rating and a minimum thickness of 1/2 inch.

c. Acceptable Suppliers:

1) Vertical runs: Acousto-Plumb or equal.

2) Horizontal runs: B-Line, Vibraclamp; Acousto-Plumb or equal.

8. Provide support for piping through roof, arranged to anchor piping solidly in place at the roof penetration.

9. Provide rigid insulation and a 12 inch long, 18 gauge galvanized sheet iron shield between the covering and the hanger whenever hangers are installed on the outside of the pipe covering.

10. Insulate copper tubing from ferrous materials and hangers with two thicknesses of 3 inch wide, 10 mil polyvinyl tape wrapped around pipe.

11. Provide a support or hanger close to each change of direction of pipe either horizontal or vertical and as near as possible to concentrated loads.

12. Suspend rods from concrete inserts with removable nuts where suspended from concrete decks. Power actuated inserts will not be allowed.

3.10 UNION AND FLANGE INSTALLATION

A. Install Watts, Epco, Nibco, or equal, dielectric unions or flanges at points of connection between copper or brass piping or material and steel or cast iron pipe or material except in drain, waste, vent, or rainwater piping. Bushings or couplings shall not be used. Dielectric unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.

B. Install unions in piping NPS 2” and smaller, and flanges in piping NPS 2-1/2” and larger whether shown or not at each connection to all equipment and tanks, and at all connections to all automatic valves, such as temperature control valves. Unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.

C. Locate the unions for easy removal of the equipment, tank, or valve.

3.11 ACCESS DOOR INSTALLATION

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers, traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.12 CONCRETE WORK

A. Concrete work required for work of this Section shall be included under another section of the Specification, unless otherwise noted, including poured-in-place concrete work for installing precast manholes, catch basins, etc., and shall include reinforced concrete bases for pumps, tanks, compressors, fan units, boilers, unless the work is specifically indicated on the Drawings to be furnished under this Section.

B. Thrust blocks, underground anchors, and pads for cleanouts, valve access boxes and washer boxes are included under this Section of the Specification. Concrete shall be 3000 psi test minimum. Refer to Division 03 for concrete types.

3.13 PIPE PROTECTION

A. Wrap bare galvanized and black steel pipe buried in the ground and to 6" above grade, including piping in conduit, with one of the following, or equal:

1. Polyethylene Coating: Pressure sensitive polyethylene coating, "X-Tru-Coat" as manufactured by Pipe Line Service Corporation or "Green Line" wrap as manufactured by Roystron Products, or equal.

    a. Field Joints and Fittings: Protecto Wrap #1170 tape as manufactured by Pipe Line Service Corporation, or Primer #200 tape by Roystron Products, or equal. Installation shall be as per manufacturer's recommendation and instructions.

2. Tape Wrap: Pressure-sensitive polyvinyl chloride tape, "Transtex #V-l0 or V-20", "Scotchwrap 50", Slipknot l00, PASCO Specialty & Mfg., Inc., or equal, with continuous identification. Tape shall be a minimum of 20 mils thick for fittings and irregular surfaces, two wraps, 50 percent overlap, 40 mils total thickness. Tape shall be laminated with a suitable adhesive; widths as recommended by the manufacturer for the pipe size. Wrap straight lengths of piping with an approved wrapping machine.

B. Field Joints: Valves and Fittings: double wrap polyvinyl chloride tape as above. Provide at least two thicknesses of tape over the joint and extend a minimum of 4 inches over adjacent pipe covering. Build up with primer to match adjacent covering thickness. Width of tape of fittings shall not exceed 3 inches. Tape shall adhere tightly to all surfaces of the fittings without air pockets.

C. Testing: Test completed wrap of piping, including all epoxy painted piping with Tinker and Rasor Co. test machine (San Gabriel, CA - 818-287-5259), Pipeline Inspection Company (Houston, TX - 713-681-5837), or equal.

D. Cleaning: Clean all piping thoroughly before wrapping.

1. Inspection: Damaged or defective wraps shall be repaired as directed. No wrapped pipe shall be covered until approved by Architect.

E. Sleeve copper piping/tubing installed below slab with “Polywrap-C” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping and orange for other piping. Install sleeve per manufacturer’s recommendations and instructions.

F. Sleeve copper piping/tubing installed outside building below grade with “Polywrap-C” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping. Install sleeve per manufacturer’s recommendations and instructions.

G. Sleeve cast iron and ductile iron pipe below grade and below slab with “Polywrap” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 8 mils thick, colored natural. Install sleeve per manufacturer’s recommendations and instructions.

H. Covering: No rocks or sharp edges shall be backfilled against the wrap or sleeve. When backfilling with other than sand, protect wrap with an outer wrapping of Kraft paper; leave in place during backfill.

3.14 PIPE IDENTIFICATION

A. Provide temporary identification of each pipe installed, at the time of installation. Temporary identification shall be removed and replaced with permanent identification as part of the work.

B. Apply the legend and flow arrow at all valve locations; at all points where the piping enters or leaves a wall, partition, cluster of piping or similar obstruction, at each change of direction and at approximately 20'-0" intervals on pipe runs. Variations or changes in locations and spacing may be made with the approval of the Architect. There shall be at least one marking in each room. Markings shall be located for maximum visibility from expected personnel approach.

C. Wherever two or more pipes run parallel, the markings shall be supplied in the same relative location on each.

D. Apply markings after painting and cleaning of piping and insulation is completed.

3.15 EXPANSION ANCHORS IN HARDENED CONCRETE

A. Refer to Structural Drawings.

B. Qualification Tests: The specific anchor shall have a current ICC-ES report and evaluated in cracked concrete in accordance with Acceptance Criteria AC193. If the specific anchor satisfies cyclic testing requirements per Acceptance Criteria AC01, Section 5.6, the full allowable shear and tension loads listed in the current ICC-ES report and manufacturer's recommendations for the specific anchor may be used. Otherwise, the design shear and tension loads shall not be more than 80% of the listed allowable shear and tension loads for the specific anchor.

C. Installation: The anchors must be installed in accordance with the requirements given in ICC Research Committee Recommendations for the specific anchor.

D. Testing: Fifty percent of the anchors shall be load-tested on each job to twice the allowable capacity in tension, except that if the design load is less than 75 pounds; only one anchor in ten need be tested. If any anchor fails, all anchors must be tested. The load test shall be performed in the presence of a special inspector.

E. The load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, a torque wrench calibrated using the specific anchor or calibrated spring-loading devices. Anchors in which the torque is used to expand the anchor without applying tension to the bolt may not be verified with a torque wrench.

3.16 PIPING SYSTEM PRESSURE TESTING

A. General:

1. Perform operational tests under simulated or actual service conditions, including one test of complete plumbing installation with fixtures and other appliances connected.

2. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.

B. Piping Systems: Test piping systems in accordance with the following requirements and applicable codes:

1. Authority having jurisdiction shall witness tests of piping systems.

2. Notify Architect at least seven days in advance of testing.

3. All piping shall be tested at completion of roughing-in, or at other times as directed by Architect.

4. Furnish necessary materials, test pumps, gases, instruments and labor required for testing.

5. Isolate from system equipment that may be damaged by test pressure.

6. Make connections to existing systems with flanged connection. During testing of new work, provide a slip-in plate to restrict test pressure to new systems. Remove plate and make final connection to existing system at completion of testing.

a. Authority having jurisdiction shall witness final connection to system.

C. Test Schedule: No loss in pressure or visible leaks shall show after four hours at the pressures indicated.

D. Testing of Sanitary Sewer, Drain, Vent, and Storm Drain may be done in segments in order to limit pressure to within manufacturer's recommendations. Test to 10 feet above highest point in the system.

System Tested	Test Pressure PSI	Test With
Sanitary Sewer, Drain, Vent	10 Ft. Hd.	Water
Storm Drain, Condensate Drains	10 Ft. Hd.	Water
Domestic Water	125	Water
Natural Gas (PE)	60	Air & Non-corrosive Leak Test Fluid
Natural Gas (Steel)	100	Air & Non-corrosive Leak Test Fluid

Compressed Air	200 lb.	Air & Non-corrosive Leak Test Fluid
Deionized Water	50	Water

1. Flush deionized water lines with deionized water after test and approval.

2. Non-corrosive leak test fluid shall be suitable for use with piping material specified, and with the type of gas conveyed by the piping system.

3.17 OPERATION OF SYSTEMS

A. Do not operate any plumbing equipment for any purpose, temporary or permanent, until all of the following has been completed:

1. Complete all requirements listed under “Check, Test and Start Requirements.”

2. Piping has been properly cleaned. Piping systems shall be flushed and treated prior to operation.

3. Filters, strainers etc. are in place.

4. Bearings have been lubricated, and alignment of rotating equipment has been checked.

5. Equipment has been run under observation, and is operating in a satisfactory manner.

B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

3.18 CHECK, TEST AND START REQUIREMENTS

A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of plumbing equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.

1. As part of the submittal process, provide a copy of each manufacturer’s printed startup form to be used.

2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer’s employees. See specific equipment Articles in these Specifications for this requirement.

3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.

4. When work has been completed, provide copies of reports for review, prior to final observation of work.

B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.

C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each operating and maintenance manual. Provide a copy of certification from the Owner's representative indicating that they have been properly instructed in maintenance requirements for the equipment installed.

3.19 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

A. Prior to observation to determine final acceptance, put all mechanical systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.

1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations.

2. Correct rotation of motors and ratings of overload heaters are verified.

3. Specified filters are installed and spare filters have been turned over to Owner.

4. All manufacturers' certificates of start-up specified have been delivered to the Owner.

5. All equipment has been cleaned, and damaged painted finishes touched up.

6. Missing or damaged parts have been replaced.

7. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.

8. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.

9. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.

10. Preliminary test and balance work is complete, and reports have been forwarded for review.

11. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.

12. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.

B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.

1. Operate and test all mechanical equipment and systems for a period of at least five consecutive 8 hour days to demonstrate the satisfactory overall operation of the project as a complete unit.

2. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment. Notify the Architect at least seven calendar days in advance of starting the above tests.

3. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.

4. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.

C. Review of Contractor's Tests:

1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.

D. Test Logs:

1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.

E. Preliminary Operation:

1. The Owner reserves the right to operate portions of the plumbing system on a preliminary basis without voiding the guarantee.

3.20 CERTIFICATES OF INSTALLATION

A. Contractor shall complete applicable “Certificates of Installation” forms contained in the California Building Energy Efficiency Standards and submit to the authorities having jurisdiction for approval and issuance of final occupancy permit, as described in the California Energy Code.

3.21 DEMONSTRATION AND TRAINING

A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.

1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.

2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.

3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner's representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:

    a. Listing of Owner-designated personnel completing training, by name and title.

    b. Name and title of training instructor.

    c. Date(s) of training.

    d. List of topics covered in training sessions.

4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

END OF SECTION

PLUMBING PIPING SYSTEMS

Section 22 10 00
21-32-051

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Valves.
3. Domestic water piping specialties.
4. Gas piping specialties.
5. Drain and waste piping specialties.

1.02 RELATED REQUIREMENTS

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

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing piping systems materials and products.

1.04 INFORMATIONAL SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Provide welding certificate for all gas pipe welders.

C. Gas Pipe Installer Qualifications: Provide evidence of current qualifications for individuals performing work requiring qualifications.

1.05 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Maintenance Data: Submit maintenance data and parts lists for plumbing piping systems materials and products. Include this data in Operation and Maintenance Manual.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

1.07 QUALITY ASSURANCE

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Gas Pipe Installer Qualifications: Individuals performing tasks requiring qualifications under Federal and State regulations shall be qualified by the gas utility supplying Project site. The qualifications shall be current at the time of performing the Work.

C. NFPA/ANSI Compliance: Fabricate and install natural gas systems in accordance with latest edition of NFPA 54/ANSI Z223.1 "National Fuel Gas Code."

D. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

E. Fabricate and install natural gas systems in accordance with California Plumbing Code.

F. Utility Compliance: Fabricate and install natural gas systems in accordance with local gas utility company requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide materials and products complying with California Plumbing Code. Where more than one type of material or product is indicated, selection from materials or products specified is Contractor's option.

B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Plastic piping components shall be marked with "NSF-pw."

2.02 PIPE AND FITTINGS ATTACHED TO AND BELOW BUILDINGS INCLUDING 5 FEET FROM BUILDINGS

A. Piping and fittings attached to covered walkways and corridors shall comply with the requirements of this article.

B. Drain and Waste Pipe Above Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard (CISPI) 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor’s option, vertical piping above floor from lavatories, sinks, and drinking fountains may be Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV weld pipe and fittings.

1. Joints above grade: No-Hub pipe conforming to ASTM A888 and CISPI 301. Couplings conforming to ASTM 1277 and CISPI 310, with stainless steel bands. Provide products by ANACO-Husky, Tyler, Ideal or equal. Provide sway brace at 20'-0" maximum spacing for suspended pipe with No-Hub joints. Provide a brace on each side of a change in direction of 90 degrees or more. Brace riser joints at each floor and at 15 foot maximum intervals (also see Specification Section 22 00 50).

C. Drain and Waste Pipe Below Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and CISPI 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor's option, hub and spigot cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A-74 and so marked, may be used.

1. Joints below grade: ANACO-Husky SD 4000, Clamp-All 125, or equal couplings and No-Hub fittings, meeting the requirements of FM 1680, SD Class I and ASTM C1540.

2. Joints below grade (hub and spigot option): Neoprene gaskets conforming to ASTM C564, as manufactured by Ty-Seal, Dual-Tite, or equal.

D. Vent Pipe:

1. 3 inch and larger: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe above grade.

2. 2-1/2 inch and smaller: Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV copper pipe and fittings.

3. Vent pipe buried in ground and to 6 inches above ground: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe below ground.

E. Type DWV copper tubing or No-Hub cast iron pipe and fittings may be used for concealed rainwater leaders. Where no-hub piping is used, the fittings and couplings shall match those used for waste piping.

F. Water Pipe (Tempered Water, Tempered Water Return, Hot Water, Hot Water Return and Cold Water): ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass. Water piping below slab: ASTM B88, Type K copper tubing, hard temper, with wrought copper fittings. At Contractor's option, pipe runs below slab having no branches may be ASTM B88, Type K annealed copper tubing without joints. See Section 22 00 50 for pipe protection requirements for below slab copper piping.

G. Temperature and Pressure Relief Valve Piping: ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass.

H. Gas Pipe: Schedule 40 black steel conforming to ASTM A53, with malleable iron threaded fittings above grade for piping 2 inch and smaller; welded piping below grade and for above grade piping larger than 2 inches, with Class 150 welding fittings.

1. Appliance Flexible Connectors for Indoor Equipment Without External Spring Isolation:

a. Contractor may choose one of the following:

1) Direct gas pipe connection.

2) Appliance flexible connector:

a) Comply with ANSI Z21.24.

b) Polymer or hot-dipped PVC coated corrugated 304 stainless steel.

c) Operating-Pressure Rating: 0.5 psig.

d) End Fittings: Zinc-coated steel.

e) Maximum Length: 30 inches.

f) Manufacturers: Dormont, Series 30C, 31, 40C, 41, and 51, Brasscraft model ProCoat, or equal.

b. Provide with end connections compatible with equipment and piping system.

c. Equipment located in spaces normally accessible to building occupants, other than maintenance personnel, shall utilize direct gas pipe connection.

I. Gas Piping Underground: Performance Pipe, “DriscoPlex” 6500 PE 2708 (yellow), Polypipe, Inc., “Polypipe”, or equal, polyethylene gas distribution pipe, ASTM D2513, ASTM D3261, and ASTM D2683 fittings with fusion welded joints. Provide piping labeled for natural gas in accordance with CPC.

1. Electrically isolate underground ferrous gas piping from the rest of the gas system with listed or approved isolation fittings installed a minimum of six inches above grade.
2. Provide Central Plastics Corp., Perfection, or equal, anodeless, single seal riser for transition from below grade polyethylene to schedule 40 steel piping above grade. Minimum horizontal length shall be 30 inches. Minimum vertical length shall be 30 inches, or greater as required. Provide fusion connection to polyethylene pipe below grade, and screwed connection to steel pipe above grade.

J. Gas Piping Aboveground to 30 inches Belowground: Schedule 40 black steel with beveled ends for welding, with Class 150 welding fittings. Mitering to form elbows or tees will not be permitted; where branch tee connections of welded piping are required, Bonney "Weldolet" Allied Pipe Fittings, or equal fittings may be used if the branch is one-half of the diameter of the main or less.

K. Condensate Drain Piping:

1. Inside buildings provide ASTM B88, Type L copper tubing and fittings. Provide Wye fittings with capped cleanout plug for tubing up to 1 inch size. Provide wrought or cast DWV fittings for sizes 1-1/4 inch and larger.

2. Outside buildings provide ASTM B88, Type L copper pipe and fittings, cast iron drain pipe and fittings or Schedule 40 galvanized steel pipe and cast iron drain or vent fittings.

3. Connect condensate drains to mechanical equipment per equipment manufacturer's recommendations; provide P-trap where required. Slope piping to drain, with 1 inch in 10 foot minimum pitch. Provide di-electric couplings or unions at connections to dissimilar materials.

4. Where Drawings indicate installation of mechanical equipment on spring isolation rails spring mounted curbs, or spring hangers, provide threaded metal connector at mechanical equipment, Metraflex Model SST, or equal by Unisource Mfg. Co., or Flexicraft Industries. Arrange flexible connection to ensure drainage of condensate, and support flexible connection at each end of connector, to ensure proper alignment.

5. Where condensate drain P-traps are required, install trap using Wye fitting on inlet and outlet of trap. Provide cap on top of each Wye, made removable for cleaning and inspection. Drill 1/8 inch diameter hole in cap at outlet of the trap to allow venting of the system. Minimum depth of trap should be 4 inches, or as recommended by the manufacturer in printed literature.

6. Provide cleanout tees or “Y” at each change in direction.

2.03 PIPE JOINING MATERIALS

A. Refer to piping Articles in this Section for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated

   a. Full-Face Type: For flat-face, Class 125, cast iron and cast bronze flanges.

   b. Narrow-Face Type: For raised-face, Class 250, cast iron and steel flanges.

2. AWWA C111, rubber, flat face, 1/8-inch (3.2mm) thick, unless otherwise indicated; and full-face or ring type, unless other indicated.

3. Flange Bolts and Nuts: AWWA C111, carbon steel, unless otherwise indicated.

4. Plastic, Pipe-Flange Gasket, Bolts and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, 100 percent lead free alloys. Include water-flushable flux according to ASTM B813.

D. Brazing Filler Metals: AWS A5.8, BCup-5 Series, copper-phosphorus unless otherwise indicated. Sil-Fos 15, or equal.

E. Welding Filler Metals: Comply with ASME B31.1 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.04 VALVES AND FITTINGS FOR POTABLE WATER SYSTEMS

A. General:

1. Provide valves and fittings conforming to lead-free requirements of California Health and Safety Code Section 11 68 75.

a. Provide valves listed to NSF/ANSI 61-G or NSF/ANSI 372 for valve materials for potable-water service.

1) Exception: Main distribution gate valves above 1-1/2 inches located underground outside building are not required to conform lead-free requirements of California Health and Safety Code Section 11 68 75.

B. Gate Valves:

1. General: Furnish valves in copper lines with adapters to suit valve/line requirements.

2. 1-1/2 inches and smaller: Minimum 200 psi CWP, bronze body, threaded bonnet, rising or non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Milwaukee UP148, UP149, Nibco T-113-LF, S-113-LF, or equal.

3. 2 inches through 3 inches: Minimum 200 psi CWP, bronze body, threaded bonnet, non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Nibco T-113-LF, S-113-LF, or equal.

4. Main distribution gate valves underground outside building above 1-1/2 inches:

a. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.

1) Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.

2) Furnish and deliver to Owner one wrench of each size required for operating underground valves.

C. Ball Valves:

1. 2 inches and smaller: 600 psi CWP, cast bronze or brass body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T-685-80-LF, Milwaukee UPBA400, Apollo 77C-LF10, Kitz 868, or equal.

2. 2-1/2 inches: Apollo 77C-LF10, or equal.

D. Calibrated Balancing Valves:

1. General: Calibrated orifice ball type rated for 400 psig maximum operating pressure and 250 degrees F. maximum operating pressure.

   a. Body: Brass.

   b. Ball: 304 Stainless Steel.

   c. Seat: Glass and Carbon filled TFE.

   d. End Connections: Threaded.

   e. Pressure Gage connections: Integral capped readout valves with internal check valves and drain port, for use with portable pressure differential meter.

   f. Handle Style: Dial, with memory stops to retain set position.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

   a. 1 inch and smaller: Bell & Gossett model CB, “LF” series.

2.05 VALVES AND FITTINGS FOR GAS SYSTEMS

A. Gate Valves:

1. 2-1/2 inches and smaller: Class150, bronze body, union bonnet, rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Hammond IB641, IB648, Nibco T-134, S-134, Milwaukee 1151, 1169, or equal.

B. Gas Shut-off Valve Above Grade:

1. 2 inches and smaller: Provide Milwaukee BB2-100, Jomar T-100NE, or equal, ball valve, CSA listed, full port.

2. Above 2 inches: Provide ReSun D-126, Key Port, or equal, CSA listed, rectangular port, full pipe area, 125 psi SWP, flanged ends. Provide T-Handle socket wrench and adapter fittings as required for operation of valves. Provide one package of spare lubricant sticks, sizes as required for valve sizes. Lubricant shall be the product recommended by valve manufacturer for use with type of gas conveyed by the piping system.

3. Provide valves same size as upstream piping. Make any reduction in size of gas piping downstream of shutoff valves.

2.06 DOMESTIC WATER PIPING SPECIALTIES

A. Hose Bibbs:

1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

   a. Acorn Engineering Co.

   b. Woodford Manufacturing Co.

2. Hose Station: Leonard THS-25-VB-CW, Symmons, or equal.

B. Wall Hydrants:

1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

   a. Acorn Engineering Co.

   b. Woodford Manufacturing Co.

   c. Mifab, Inc.

C. Water Hammer Arrestors:

1. Provide water hammer arrestors conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, with nesting type bellows contained within a casing having sufficient displacement volume to dissipate the calculated kinetic energy generated in the piping system. Water hammer arrestors shall be sized for type and number of fixtures served. Provide all stainless steel shell construction with stainless steel bellows and threaded connection to water system.

2. Water hammer arrestors shall be certified under P.D.I. Standard WH201 and by ASSE Standard 1010.

3. Select units in accordance with the requirements of Plumbing and Drainage Institute Standard P.D.I. WH201. Install above ceilings or behind wall access door at each plumbing fixture, or where plumbing fixtures are installed in groups, at each group of fixtures.

4. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

a. Josam Company, series 75000.

b. Smith (Jay R.) Mfg. Co., Hydrotrol 5005-5050.

c. Mifab, series WHB.

D. Thermostatic Water Temperature Control Valve:

1. Provide thermostatic water temperature control valve conforming to lead free requirements of California Health and Safety Code Section 11 68 75, with size as noted on Drawings, complete with union angle strainer checkstops. Valves shall be thermostatic type, with a maximum temperature setting as follows:

2. Provide surface semi-recessed mounted, stainless steel cabinet with locking door for control valves. Including:

   a. Control valve cabinet and valve shall be provided as a package, and include thermostatic water mixing valve, thermometer, safety checkstops, volume control valve and internal piping.

3. Where indicated on drawings, provide a temperature alarm system, utilizing a micro-processor based controller and solid state temperature controller. Provide audible and visual indication of high and low temperature set points. Provide required hardware and wiring for a complete operating system.

   a. Provide isolation transformer for control of the alarm system.

   b. Provide solenoid valve and shock absorber, installed and wired to the alarm module.

4. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

   a. Leonard Valve Company.

   b. Lawler Manufacturing Co., Inc.

   c. Powers.

E. Relief Valves:

1. Provide relief valves as indicated, of size and capacity as selected by Contractor for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.

2. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI A21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F, and pressure relief at 150 psi.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. Watts Regulator Company.

    b. Cash (A.W.) Valve Manufacturing Corporation.

    c. Zurn Industries, Inc.; Wilkins-Regulator Division.

2.07 DRAIN AND WASTE PIPING SPECIALTIES

A. Cleanouts:

1. General: Install cleanouts of same diameter as pipe (4 inch maximum) in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 18 inches from building construction so as to provide sufficient space for rodding. No horizontal run over 50 feet inside buildings or 100 feet outside buildings shall be without cleanout, whether shown on Drawings or not. Provide two-way cleanouts where indicated on drawings, and where required for satisfactory use.

    a. Provide cleanouts in waste drop from each sink and urinal.

    b. Provide one wrench for each size and type of cleanout used. Turn over to Owner at completion of the project, and obtain receipt. Place receipt in Operation and Maintenance Manuals.

2. Cleanouts in floor and in concrete sidewalks: Ducco Cast Iron with nickel bronze top, clamping collar and ABS plastic plug: Zurn ZN-1400-KC, or equal, with square or round top to suit floor construction.

3. Cleanouts in composition floors: Zurn ZN-1400-X-DX, or equal (nickel bronze top).

4. Cleanouts in concealed, aboveground cast-iron soil or waste lines: Zurn Z-1440A, or equal, with ABS plastic plug.

5. Cleanouts in walls: Zurn Z-1441 or Z-1443, or equal, with stainless steel cover. Provide long sweep elbow or combination wye at connection to riser and install with surface of cleanout within ½ inch of front face of finished wall.

    a. Where space does not permit the above installation, provide Zurn Z-1446, or equal, with stainless steel access cover, and vandal resistant screw.

    b. Install face of cleanout plug within 1/2 inch of front face of finished wall.

B. Floor Drains:

1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

    a. J.R. Smith.

    b. MIFAB.

    c. Watts.

    d. Zurn.

C. Floor Sinks:

1. Floor Sinks: Provide anchoring flange (seepage pan) at all floor sinks, and provide flashing clamp in locations where floor membrane is used. Provide cast iron "P" trap and trap primer connection at P-Trap.

2. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

    a. J.R. Smith.

    b. MIFAB.

    c. Watts.

    d. Zurn.

D. Hopper Drains:

1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

    a. Zurn.

    b. J.R. Smith.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.

B. Make all arrangements for the utilities required. Pay all costs involved in obtaining the services including gas service and meter, water meter, pressure reducing valve, access

boxes, street work. Connect to site utilities. Verify the location of all services. No extra cost will be allowed if services are not as shown.

C. Determine sanitary sewer and storm drain location and elevation at all points of connection before installing any piping. Notify Architect immediately if indicated grades cannot be maintained.

D. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately. Do not allow piping systems to be pressurized without written consent of the Architect.

3.02 INSTALLATION OF WATER PIPING

A. Run all water piping generally level, free of traps or unnecessary bends, arranged to conform to the building requirements, and to suit clearance for other mechanical work such as ducts, flues, conduits, and other work. No piping shall be installed so as to cause unusual noise from the flow of water therein under normal conditions.

B. Provide manufactured water hammer arrestors, sized and installed in accordance with Plumbing and Drainage Institute Standard PDI WH201.

1. Locate water hammer arrestors at every plumbing fixture, or, where fixtures are located in groups, at every group of fixtures, and as indicated on Drawings.

2. Install water hammer arresters above accessible ceilings, or install access doors for service.

C. In freezing locations arrange water piping to drain as shown.

D. Install piping on room side of building insulation.

E. Check final location of rubber rings within couplings on PVC water piping with gauge or as recommended by manufacturer. Make connection to valves with cast iron adapters connected to water pipe with cast iron couplings. Furnish and install anchors or thrust blocks.

3.03 INSTALLATION OF SANITARY AND STORM DRAINAGE SYSTEMS

A. Sewer Piping: Run all horizontal sanitary drain piping inside of building on a uniform grade of not less than 1/4 inch per foot unless otherwise noted or later approved. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.

B. Storm Drain Piping: Run all horizontal storm drain piping inside of building on a uniform grade of not less than 1/4 inch per foot. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.

C. Install rainwater leader nozzles at exposed bottom of leaders where they spill onto grade.

D. Run all drainage piping as straight as possible and provide easy bends with long turns; make all offsets at an angle of 45 degrees or less.

E. Grade all vent piping so as to free itself quickly of any water condensation.

F. Where possible, join groups of vent risers together with one enlarged outlet through roof. Maintain minimum of 10 foot horizontal or 3 foot vertical clearance from air intakes.

G. Install drip pan under storm drain piping, sanitary drain piping, and vent piping that must be run over kitchen areas.

H. Hubless Cast Iron Joints: Comply with coupling manufacturer's installation instructions.

3.04 INSTALLATION OF NATURAL GAS PIPING

A. Install natural gas piping in accordance with Division 22 Basic Plumbing Materials and Methods sections.

B. Use sealants on metal gas piping threads that are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

C. Remove cutting and threading burrs before assembling piping.

D. Do not install defective piping or fittings. Do not use pipe with threads that are chipped, stripped, or damaged.

E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping or equipment connections are completed.

F. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

G. Install drip-legs in gas piping where indicated and where required by code or regulation.

1. Install "Tee" fitting with bottom outlet plugged or capped at bottom of pipe risers.

2. Where gas supply is connected to equipment with flexible connectors, install drip-leg in piping on downstream side of flexible connector, and install shut off valve on piping on upstream side of flexible connector.

H. Install piping with 1/64 inch per foot (1/8 percent) downward slope in direction of flow.

I. Install piping parallel to other piping.

J. Paint all gas piping installed in exposed exterior locations. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods, article, Painting.

K. Provide exterior shutoff valve at each building. Provide sign affixed to wall at valve location reading: “Gas Shut-Off.” Size and location of the sign shall be as required by the Authority Having Jurisdiction. Where gas piping enters a building in more than one location, exterior

shutoff valves shall have a permanently attached metal tag identifying the area served by that valve, in addition to sign on wall.

L. Provide watertight Schedule 40 PVC conduit to protect gas piping installed below covered walk, covered driveways, and where noted on Drawings. Extend sleeve at least 12 inches beyond any area where it is required to be installed, and terminate with valve box extended to grade, and marked "GAS".

3.05 PIPE JOINTS AND CONNECTIONS

A. General:

1. Cutting: Cut pipe and tubing square, remove rough edges or burrs. Bevel plain ends of steel pipe.

2. Remove scale, slag, dirt and debris from inside and outside of pipe before assembly.

3. Boss or saddle type fittings or mechanically extracted tube joints will not be allowed.

B. Threaded Pipe: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply thread compound to external pipe threads: Rectorseal No. 5, Permatex No. 1, or equal.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

C. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

D. Copper Pipe and Tubing (Except pneumatic control piping): All joints shall be brazed according to ASME Section IX, Welding and Brazing Qualifications, except domestic water piping 1-1/4 inches and smaller when not buried in the ground or concrete and type DWV plumbing piping may be soldered.

1. Soldered joints: Apply water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828.

E. Cast Iron Soil Pipe:

1. No-Hub fittings shall be made with a torque wrench.

2. Hub joints shall be with Ty-Seal couplings.

3. Wrought iron, steel, or copper pipe shall have a ring or part of a coupling screwed on to form a spigot end if caulked into a joint.

4. Connect cast iron sewer piping to outside service pipe with cast iron or vitrified LOP reducers or increasers as required. Caulking of smaller pipe into the larger without a reducer or increaser will not be permitted.

F. Welded Pipe:

1. Make up with oxyacetylene or electric arc process.

2. All line welds shall be of the single "V" butt type. Welds for flanges shall be of the fillet type.

3. Where the branch is two pipe sizes smaller than the main or smaller, Bonney Weldolets, Threadolets, Nibco, or equal, may be used in lieu of welding tees.

3.06 INSTALLATION OF VALVES

A. Install valves as indicated on Drawings and in the following locations:

1. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.

2. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere indicated or required to completely drain potable water system.

3. Provide gate or globe valves on inlet and outlet of each water heater or pump.

B. General:

1. Valves shall be full line size unless indicated otherwise on Drawings.

2. Install horizontal valves with valve stem above horizontal, except butterfly valves.

3. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

4. Locate valves for easy access and provide separate support where necessary.

5. Install valves in position to allow full stem movement.

6. Install exposed polished or enameled connections with special care showing no tool marks or exposed threads.

7. Butterfly valves conforming to the paragraph “Butterfly Valves” may be used in lieu of gate or globe valves for locations above grade.

8. Ball valves conforming to the paragraph “Ball Valves” may be used in lieu of gate valves for locations above grade for services 2-1/2 inches and smaller.

9. Valves 2-1/2 inches and smaller (except ball valves) in nonferrous water piping systems may be solder joint type with bronze body and trim.

10. Rigidly fasten hose bibbs, hydrants, fixture stops, compressed air outlets, and similar items to the building construction.

C. Gate Valves:

1. Furnish valves in copper lines with adapters to suit valve / line requirements.

2. Underground gate valves:

a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.

b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.

D. Silent Check Valves: Install in horizontal or vertical position between flanges.

E. Calibrated Balancing Valves: Install calibrated balancing valves per manufacturers' recommendations, including requirements for straight pipe lengths at valve inlet and outlet.

F. Gas Shut-Off Valves:

1. Provide line size ball valve in gas line to each appliance.

G. Valve Adjustment: Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.07 INSTALLATION OF CLEANOUTS

A. Cleanouts: Install in piping as indicated, as required by California Plumbing Code, at each change in direction of piping greater than 45 degrees. Install at maximum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping inside buildings, and at base of each conductor.

B. Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through water resistant membrane.

3.08 INSTALLATION OF FLOOR DRAINS AND FLOOR SINKS

A. Install drains in accordance with manufacturer's written instructions and in locations indicated. Install floor drains with lip of drain slightly below finished floor to ensure drainage. Install floor sinks flush with finished floor. Coordinate with other trades to ensure that floor slopes to drain. Provide flashing flange and clamping device with each drain passing through water resistant membrane.

3.09 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated.

B. Mechanical Equipment Connections: Connect hot and cold water piping system and gas piping system to mechanical equipment as indicated, and provide with shutoff valve and union for each connection.

3.10 DOMESTIC WATER SYSTEM STERILIZATION

A. Clean and disinfect new or altered hot and cold water piping connected to domestic water systems using methods prescribed by the Health Authority. If the Health Authority does not prescribe methods, clean and disinfect new or altered hot and cold water piping using methods given in the California Plumbing Code.

1. A water treatment company that has a current state EPA license to apply disinfectant chlorine in potable water shall perform the procedure.

3.11 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Remove labels from stainless steel sinks, except 316 stainless steel sink labels should be retained to confirm that the correct material has been provided. Leave systems and equipment in satisfactory operating condition.

3.12 OPERATIONAL TESTS

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.13 TESTING AND BALANCING

A. See Section 23 05 93 of Specifications for testing and balancing requirements.

3.14 CLEANING UP

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

PLUMBING FIXTURES

Section 22 40 00
21-32-051

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Water supplies and stops.
2. Plumbing fixture hangers and supports.
3. Refrigerator ice maker outlet boxes.
4. Dishwasher air gap fittings.
5. Solids interceptors.

1.02 RELATED REQUIREMENTS

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

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished.

1.04 INFORMATIONAL SUBMITTALS

A. Refer to Section 22 00 50, Basic Plumbing Materials and Methods.

1.05 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Plumbing Fixture Standards: Comply with applicable portions of the following codes and requirements for all work in this Section:

1. California Building Code – CBC
2. California Plumbing Code – CPC
3. California Health and Safety Code
4. American National Standards Institute - ANSI
5. Federal Standards - F.S.
6. National Sanitary Foundation – NSF International

C. ANSI Standards: Comply with ANSI/NSF 61, “Drinking Water System Components – Health Effects.”

D. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.

E. UL Labels: Provide water coolers that have been listed and labeled by Underwriters' Laboratories.

F. ARI Labels: Provide water coolers that are rated and certified in accordance with applicable Air-Conditioning and Refrigeration Institute Standards.

G. Americans with Disabilities Act (ADA) and CBC Chapter 11B.

H. California Green Building Standards Code Requirements:

1. Single Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES

A. General: Provide factory fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete, installation. Where more than one type is dedicated, selection is Contractor's option; but, all fixtures of same type must be furnished by single manufacturer.

1. Take special care with the roughing-in and finished plumbing where batteries of fixtures occur.
2. Take location and mounting heights for roughing-in from Architectural Drawings.
3. Follow schedule on Plumbing Drawings for roughing-in connections. Set roughing-in for all fixtures exactly as per measurements furnished by the manufacturers of the fixtures used.

4. Roughing-in for lavatories and sinks shall be brought in through the wall under the centerline of the drain from the fixture wherever possible and as close to the fixture as possible.

2.02 MATERIALS

A. Provide materials that have been selected for their surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.

B. Where fittings, trim and accessories are exposed or semi-exposed, provide, chromium plated 17 gauge seamless brass and match faucets and fittings. Provide 17 gauge seamless copper or brass where not exposed.

C. Handles on all faucets and stops shall be all metal chromium plated.

D. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.

2.03 PLUMBING FITTINGS, TRIM AND ACCESSORIES

A. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and as required to operate as indicated.

1. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shut-down of water supply piping systems.

B. P-Traps: Include IAPMO approved removable P-traps where drains are indicated for direct connection to drainage system. P-Traps shall be less trap screw cleanout, and incorporate a chrome plated cast brass body, brass connection nuts, 17 gauge seamless brass wall return and chrome plated wall escutcheon to match trap finish.

C. Carriers: Provide cast iron supports for fixtures of graphitic gray iron, ductile iron, or malleable iron as indicated. Where the carrier for wall mounted water closets are installed more than 6 inches behind the finished wall, provide water closet support for wide pipe chase.

D. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

E. Escutcheons: Where fixture supplies and drains penetrate walls in exposed location, provide chrome-plated cast brass escutcheons with setscrews.

F. Aerators: Provide aerators of types approved by Health Departments having jurisdiction. Delete aerators where not allowed by CPC for health care occupancies.

G. Comply with additional fixture requirements contained in Fixture Schedule shown on the drawings.

2.04 MANUFACTURERS

A. In accordance with California Plumbing Code, provide indelibly marked or embossed manufacturers name or logo, arranged so as to be visible after installation.

B. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:

1. Vitrified China Plumbing Fixtures:

    a. American Standard, U.S. Plumbing Products.

    b. Eljer Plumbingware Div., Wallace-Murray Corp.

    c. Kohler Co.

    d. VitrA.

2. Plumbing Trim:

    a. McGuire Manufacturing Co., Inc.

    b. Delta Commercial.

    c. Chicago Faucet Co.

    d. T&S Brass and Bronze Works, Inc.

3. Flush Valves:

    a. Sloan Valve Co.

    b. Zurn Industries, Hydromechanics Div.

    c. Toto USA, Inc.

4. Faucets:

    a. Chicago Faucet Co.

    b. Symmons Scott.

    c. T&S Brass and Bronze Works, Inc.

    d. Delta Commercial.

5. Fixture Seats:

    a. Church Seat Co.

    b. Bemis Mfg. Co.

c. Beneke Corp.

6. Service Sinks:

a. American Standard.

b. Kohler Co.

c. Williams Serviceptor.

d. Florestone.

e. Acorn.

7. Stainless Steel Sinks:

a. Elkay Mfg. Co.

b. Just Mfg. Co.

c. Haws Corporation.

8. Fixture Carriers:

a. Josam Mfg. Co.

b. J. R. Smith.

c. Tyler Pipe; Wade Div.

d. Zurn Industries; Hydromechanics Div.

e. Mifab, Inc.

2.05 FLUSH VALVE REQUIREMENTS

A. Metering flush valves where required and specified shall be non-hold open type with exposed parts chrome plated. Conform to all codes and manufacturers' recommendations. All diaphragms are to have multiple filtered bypass and be chloramine resistant synthetic rubber with internal components suitable for l80 degree hot water to l50 pounds pressure, plastic or leather diaphragm not acceptable.

2.06 FIXTURE CONNECTIONS

A. Make connection between fixtures and flanges on soil pipe absolutely gastight and watertight with neoprene type gaskets (wall hung fixtures) or bowl wax (floor outlet fixtures). Rubber gaskets or putty will not be permitted.

B. Provide fixtures not having integral traps with P-traps of chromium-plated 17 gauge cast brass, with 17 gauge seamless brass wall return, connected to concealed waste in wall and sanitary fittings. Provide IAPMO approval for trap, and provide less trap screw cleanout.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. Dearborn Brass, Commercial series with brass nuts.

    b. Delta Commercial.

    c. McGuire Manufacturing Co., Inc.

C. Connections from stacks or horizontal wastes to wall or floor finish for wastes from lavatories, urinals, sinks, and drinking fountains and connection between floor drains and traps shall be IPS 85 percent red brass pipe.

D. Unions on waste pipes on fixture side of traps may be slip or flange joints with soft rubber or lead gaskets. Traps shall rough in full size to waste and vent connection, using deep escutcheon plate to cover wall penetration. Compression adaptor extensions or sweat adaptors are not acceptable.

2.07 WATER SUPPLIES AND STOPS

A. Provide 85 percent IPS threaded red brass nipple, conforming to the lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have stop valves installed on water supply lines.

B. Provide water supplies to fixtures with compression shut-off stops with threaded inlets and lock shield-loose key handles. Provide combination fixtures with compression stop and threaded inlet on each water supply fitting. Provide lock shield-loose key handle for each stop.

C. Provide 1/2 inch riser tubes with reducing coupling for fixtures, unless otherwise noted.

D. Provide cast brass escutcheon.

E. Furnish shut-off valves on hose bibbs where directly connected to mains with no intervening valves.

F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. McGuire Manufacturing Company, Inc., model LFH2167LK.

2. T & S Brass and Bronze Works, Inc., model B-1305.

2.08 PLUMBING FIXTURE HANGERS AND SUPPORTS

A. Residential type fixture supports are not acceptable.

B. Install wall mounted water closets with combination support and waste fittings, with feet of support securely anchored to floor.

C. Install floor mounted water closets with J.R. Smith, Zurn, or equal government pattern cast iron closet flanges with brass bolts, nuts, washers, and porcelain caps secured with Spackle.

D. Install the following fixtures on concealed support with feet of support securely anchored to floor. Anchor top of support to wall construction in an approved manner.

1. Wall hung lavatories.

2. Wall mounted urinals.

2.09 PLUMBING FIXTURES

A. Install all plumbing fixtures at height indicated on Architectural Drawings. Where mounting height is not indicated, install at height required by Code requirements in CBC Chapter 11B-604.

B. Special Requirements For Accessible Fixtures:

1. Operating handle or valve for accessible water closets, urinals, lavatories, and sinks shall operate with less than 5 pounds force. Metering faucets shall be adjusted to operate between 10 and 15 seconds.

2. Insulate exposed waste piping and domestic water supplies below accessible fixtures with CBC access code compliant molded “closed-cell” vinyl covers. Covers shall be installed using vandal resistant fasteners and must be removable. Covers shall meet flame spread rating not to exceed 25 and smoke density not to exceed 50 when tested in accordance with ASTM E-84, and shall comply with the requirements of California Code of Regulations, Title 24. Plumberex – Handy Shield, Johns Manville – Zeston 2000, or equal.

PART 3 - EXECUTION

3.01 PRODUCT HANDLING AND PROTECTION

A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

3.02 PREPARATORY PROVISIONS

A. The Contractor is responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section. Do not proceed until all unsatisfactory conditions have been corrected. Commencing work will be construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.03 INSPECTION AND PREPARATION

A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any

incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the National Standard Plumbing Code pertaining to installation of plumbing fixtures.

C. Fasten plumbing fixtures securely to supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies to blocking behind or within wall construction so as to be rigid, and not subject to pull or push movement.

D. Install CBC accessible fixtures in accordance with Chapter 4 California Plumbing Code, and Chapters 11A and 11B California Building Code.

E. Refer to Division 26 for wiring for electronic flush valves.

3.04 FAUCET INSTALLATION

A. Provide 85 percent IPS red brass pipe, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to faucets, stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have a stop valve installed on water supply lines to permit repairs without shutting off water mains.

B. Adjust metering faucets to run for 10 to 15 seconds.

3.05 CLEAN AND PROTECT

A. Clean plumbing fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during the remainder of the construction period.

C. Grout voids between all fixtures and adjacent surfaces with white Dow Silicone Sealant, arranged to shed water.

3.06 FIELD QUALITY CONTROL

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

3.07 EXTRA STOCK

A. General: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every ten units.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. Commercial electric water heaters.
2. Gas fired water heaters.
3. Expansion tanks.
4. In-line domestic hot water recirculation pumps.

1.02 RELATED REQUIREMENTS

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

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Product Data: Submit manufacturer's plumbing equipment specifications, installation and start-up instructions, capacity and ratings, with selection points clearly indicated.

1.04 INFORMATIONAL SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

1.05 CLOSEOUT SUBMITTALS

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Maintenance Data: Submit maintenance data and parts lists for each item of plumbing equipment. Include "trouble-shooting" maintenance guides. Include this data in Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

B. Trade names or catalog numbers stated herein indicates grade or quality of materials desired.

C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.

D. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.

E. CEC Compliance: Comply with California Electrical Code (Title 24, Part 3) as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.

F. ANSI Compliance: Comply with ANSI Z223.1 (NFPA 54) "National Fuel Gas Code", as applicable to installation of gas-fired water heaters.

G. CSA/UL Labels:

1. Provide gas-fired water heaters that have been listed and labeled by CSA International or Underwriters Laboratories, certifying design according to ANSI Z21.10.1-CSA 4.1 standards governing storage-type water heaters with input ratings of 75,000 BTU/hr. or less.

2. Provide gas-fired water heaters that have been listed and labeled by CSA International or Underwriters Laboratories, certifying design according to ANSI Z21.10.3-CSA 4.3 standards governing storage-type water heaters with input ratings of greater than 75,000 BTU/hr.

H. ASME Relief Valve Stamps: Provide water heaters with safety relief valves bearing ASME valve markings.

I. ASME Code Symbol Stamps: For the following equipment, comply with ASME Boiler and Pressure Vessel Code for construction, and stamp with ASME Code symbol:

1. Water Heaters 200 MBH and greater.

J. California Energy Commission Compliance: Provide written confirmation of listing of all water heaters in the "Appliance Efficiency Database."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

1.08 WARRANTY

1. Commercial Electric Water Heaters: Three-year minimum limited warranty on tank leakage.

2. Direct Vented Sealed Combustion Condensing Gas-Fired Water Heater: Three-year minimum limited warranty on tank.

PART 2 - PRODUCTS

2.01 MATERIALS

A. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.

B. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.02 COMMERCIAL ELECTRIC WATER HEATERS

A. General: Provide commercial electric water heaters of size, capacity, and electrical characteristics indicated on Drawings. Comply with ASHRAE 90.1 for energy efficiency. Provide UL listing. Relief valve dip tube shall extend to within 3 inches of tank.

B. Heater: Working pressure of 150 psi, magnesium anode rod; glass lining on internal surfaces exposed to water.

C. Heating Elements: Heavy-duty, medium watt density, with incoloy sheath or zinc plated copper, thermostat stepped through magnetic contactor.

D. Safety Controls: Double-pole, manual-reset, high-limit, probe type electric water low water cutoff; both factory wired.

E. Jacket: Equip with full size control compartments with front panel opening. Insulate tank with vermin resistant polyurethane or glass fiber insulation. Provide outer steel jacket with bonderized undercoat and baked enamel finish.

F. Provide the following accessories:

1. Brass drain valve.

2. 3/4 inch temperature and pressure relief valve.

3. Thermometer.

G. Provide equal flow manifold for piping entering and leaving the water heaters. Manifold shall be provided as a standard option for the heaters proposed.

H. Controls: Adjustable immersion thermostat or surface mounted therm-o-disc; power circuit fusing.

I. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Bradford White Corporation.

2. Lochinvar Corporation.

3. PVI Industries, LLC.

4. Rheem Manufacturing Company.

5. Smith, A.O. Water Products Co.; a division of A.O. Smith Corporation.

2.03 EXPANSION TANKS

A. Provide thermal expansion tanks of size and number as indicated on Drawings, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75. Construct tank of welded steel for working pressure of 125 psi. Provide specially compounded flexible diaphragm securely sealed into tank to permanently separate air charge from system water, to maintain design expansion capacity.

1. Tanks shall be IAPMO approved and listed for use with domestic water systems.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Amtrol, Inc.

2. A.O. Smith Water Products Company.

3. Watts Water Technologies, Inc.

2.04 IN-LINE DOMESTIC HOT WATER RECIRCULATION PUMPS

A. Provide lead-free in-line domestic water recirculation pumps where indicated on Drawings and of capacities as scheduled on Drawings. Pumps shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

B. Pumps shall be of the centrifugal type with non-overloading characteristics and shall not overload the motor above its nameplate horsepower rating under any operating condition. No allowance for service factor shall be used in pump selection. Motor horsepower shown is minimum; furnish larger motors if necessary to meet the non-overloading requirements.

C. Type: Horizontal, designed for 125 thru 150 psi maximum working pressure and 225 degrees F continuous water temperature.

D. Construction: Bronze casing, non-metallic impeller.

E. Shaft: Ceramic, supported by carbon bearings. Bearings shall be lubricated by the pumped water.

F. Motors shall have permanently lubricated ball bearings. Motors shall meet NEMA specifications. Motors shall have built-in thermal overload or impedance protection.

G. Provide control wiring between field-installed controls, indicating devices, and pump control panels as work of this section, complying with requirements of Division 26 sections:

1. Control wiring specified as work of Division 23 for Automatic Temperature Controls is work of that section.

H. Wire pumps to mechanical control circuits to shut down pump when building is not occupied. Where no control system is installed, furnish pump manufacturers standard timer to automatically turn off circulating pump when hot water is not required.

I. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Grundfos Pumps Corporation.

2. Bell & Gossett, ITT Corporation.

3. Taco Incorporated.

4. Armstrong Pumps, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The Contractor shall be responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section and shall not proceed until all unsatisfactory conditions have been corrected. Commencing work shall be construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.02 ELECTRIC WATER HEATER INSTALLATION

A. Install electric water heaters as indicated, in accordance with manufacturer's installation instructions and in compliance with applicable codes.

B. Furnish wiring diagram to Electrical Installer. Refer to Division 26 for wiring of units, not work of this section.

C. Connect to hot and cold water lines with shutoff valve, check valve, and dielectric union in the cold water line, and ASME standard pressure and temperature relief valve and dielectric union in the hot water line. Connect drain and relief piping as noted on Drawings.

D. Start-up, test, and adjust electric water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.

E. After installation has been completed, seal bottom of heaters without feet to floor with silicone sealer.

3.03 PUMP INSTALLATION

A. Install pumps where indicated, in accordance with manufacturer's published instructions, complying with recognized industry practices to ensure that pumps comply with requirements and serve intended purposes.

B. Provide access space around pumps for service as indicated, but in no case less than that recommended by manufacturer.

C. Install in-line pumps with support from overhead structure on each side of pump, or as indicated on Drawings.

D. Support piping from the building structure so as to prevent any strain on the pump casings. Provide a final check for perfect alignment of the piping connections after pump has been secured to its base. Provide valves, accessories, gauges, flexible connections, and supports as indicated.

E. Install electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

F. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 26 sections. Do not proceed with equipment start-up until wiring installation is complete and correct.

G. Check alignment, and where necessary, realign shafts of motors and pumps within recommended tolerances by manufacturer.

H. Lubricate pumps before start-up. Start-up in accordance with manufacturer's instructions.

I. Increase piping immediately at pump suction and discharge; flexible couplings and all valves shall be full line size.

J. Trim pump impeller to obtain the desired water flow after installation, without cost to Owner.

K. Pumps shall not be connected to piping before piping is thoroughly flushed and cleaned of all dirt and grit. After piping connections have been made, systems shall be filled before starting pumps. Pumps shall not be run dry under any circumstances.

3.04 DEMONSTRATION AND TRAINING

A. Provide a minimum of 8 hours of training and orientation of Owners staff in proper care and operation of Plumbing Equipment.

3.05 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Leave systems and equipment in satisfactory operating condition.

3.06 OPERATIONAL TESTS

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.07 CLEANING UP

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the general requirements for the electric work. These requirements apply to all sections of Division 26.

B. Provide electrical materials, equipment, services, rentals, labor and testing to complete the installation and testing of the electrical work specified in the Construction Documents.

1.02 GENERAL REQUIREMENTS

A. No exposed conduit or surface raceway, except in Mechanical yard or equipment rooms, shall be permitted without written approval from the Engineer.

B. Multi-wire branch circuits shall not be permitted. Provide a dedicated neutral for all branch circuits requiring a neutral.

C. Provide shop drawings, materials, labor and testing for all work not explicitly shown or specified in the Constructions Documents but is still required to be completed in order to have a complete and functioning system or facility as specified. Review the bid documents carefully and identify all areas in the constructions documents which require shop drawings and include them in the bid. For example, if an emergency generating system is specified with a remote tank and fuel transfer system and the interconnection wiring of the fuel transfer system was not explicitly included in the Construction Documents, then it is the Contractor's responsibility to provide shop drawings, services (e.g., structural engineer services), materials and labor necessary to complete and test the fuel transfer system so that specified Emergency Generating System meets codes requirements and functions as intended. This also includes but is not limited to mounting details, vendor supplied systems such as UPS, digital lighting, Telecom Systems, Audio Visual, Fire Alarm, etc. Shop drawings shall be submitted to the Engineer for review and approval. Shop drawings will be stamped in accordance with code and plan review requirements.

D. Provide a UL label or evidence of UL listing for all electrical material, unless the material is of a type for which a label or listing service is not provided.

1.03 CODE COMPLIANCE

A. Perform all work in accordance with the following codes:

1. California Electrical Code 2019
2. California Building Code 2019
3. California Fire Code 2019
4. California Mechanical Code 2019
5. California Plumbing Code 2019
6. California Building Standards Administrative Code 2019

7. California Green Building Standards Code 2019

8. California Energy Code 2019

9. All Applicable State and Local Codes and Regulations

1.04 PERMITS, FEES AND INSPECTIONS

A. Obtain all permits that are required for the work.

B. Call for all local building department inspections.

C. Obtain approvals from local building inspector prior to final observation by Engineer.

D. Advise Engineer, one week prior to:

1. Installation of underground work. Obtain Engineer's approval prior to backfill. The Engineer may direct uncovering of any work not so approved.

2. Start of interior rough-in work.

3. Installation of switchboards and motor control centers.

1.05 STANDARDS

A. Comply with the current applicable standards of the listed agencies for electrical materials and installation.

B. Underwriters Laboratories, Inc. (UL): Provide a UL label or evidence of UL listing for all electrical material, unless the material is of a type for which a label or listing service is not provided.

C. National Electrical Manufacturer's Association (NEMA).

D. American National Standards Institute (ANSI).

E. American Society for Testing Materials (ASTM).

F. Insulated Power Cable Engineers Association.

G. Certified Ballast Manufacturer's Association.

H. Institute of Electrical and Electronic Engineers (IEEE).

1.06 SUBMITTALS

A. Provide submittals for items specified in individual sections of Division 26 0000, in accordance with the requirements of Division 1.

B. Procedure: Submit under provisions of Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements.

C. Provide submittals for items listed documenting compliance with specification requirements.

1. Materials and Services

2. Contractor prepared Acceptance Test Procedures for Engineering review and approval.

3. Acceptance Test Results

4. Shop drawings

5. Operation and Maintenance Manual, in accordance with Section 01 7800 - Closeout Submittals.

6. Record Drawings, in accordance with Section 01 7800 - Closeout Submittals.

7. Other- Submittals required elsewhere in the Construction Documents.

1.07 MATERIALS AND SUBSTITUTIONS

A. Provide new material of the quality specified and satisfactory to the Engineer.

1. Provide major equipment which is the product of a manufacturer who has, for a period of not less than five years been in successful manufacture of similar equipment to that specified and who has a catalog covering ratings and specifications of proposed equipment.

1.08 DRAWINGS AND SPECIFICATIONS

A. Data given herein and on the plans are exact as could be secured, but their absolute accuracy is not guaranteed. Plans and specifications are for the assistance and guidance of the Contractor and exact locations, distances, levels and other data will be governed by the structures. The contractor shall provide a layout plan of all electrical equipment showing actual dimensions and working clearances. The contractor is responsible for ensuring that all electrical equipemt will fit and no working clearances are exceeded.

B. Clarification of plans and specifications for the purpose of facilitating construction, but not involving additional labor and materials, may be prepared during construction by the Engineer. Said revised plans and specifications shall become a part of the contract. The Contractor shall conform to the revised plans and specifications at no additional cost to the Owner.

C. Layouts of equipment, accessories, and wiring systems are diagrammatic but follow these as closely as possible. Examine Architectural, Structural, and Mechanical and other drawings, noting all conditions that may affect this work. Report conflicting conditions to the Engineer for adjustment before proceeding with the work. Should the Contractor proceed with work without so reporting the matter, he does so, on his own responsibility and shall alter work if directed by the Engineer at his own expense.

D. The right is reserved to make minor changes in locations of equipment and wiring systems shown, providing the change is ordered before conduit runs and/or work directly connected to same is installed and no extra materials are required.

1.09 UTILITY COORDINATION

A. Coordinate with the electric utility company and the telephone company whenever necessary, to determine service equipment requirements, conduit and backfill requirements, electric metering requirements and other requirements to provide complete utility services, adequate to supply the electrical and communication system(s) indicated. Provide materials that are specified in Division 26 in addition to conforming to utility company requirements.

B. Include in bid, all work required by the utility companies. All work required for utility services shall be in accord with contract documents, specifications, drawings and as required by the utility companies.

C. Use extreme caution when digging to avoid buried electrical cables.

1. Before digging, call:

2. (800) 642-2444

1.10 HOMERUNS AND MAXIMUM NUMBER OF CIRCUITS

A. 120 VAC, 20 A circuit- Maximum of (9) #12 conductors in conduit (assume ambient temp for 120 Deg F, 90 Deg C wire). Homeruns may combine branch circuits by using a maximum of (20) # 10 conductors in 1.25” minimum diameter conduit.

1.11 CUT OVER

A. Prepare, submit and implement the cut over procedure. Provide all necessary materials, equipment, services, and rentals (e.g., generators, UPS, ATS) for the cut over. No disruption in power or any interference with Operations is permitted without Owner's approval. Have cut over coordination meetings with all necessary participants (Owner, Engineers, Vendors, Subcontractors) at least before preparing the cut over procedure and before conducting the approved procedure. Additional meetings may be required (e.g., resolve start up issues).

1.12 SUPERVISION

A. Provide adequate and competent supervision. Maintain complete control of the project execution and complete liability for the materials and work until the job is completed and accepted by the Owner.

1.13 MANUFACTURER'S INSTRUCTION

A. Follow the manufacturer's instructions when specific installation or connection details are not indicated or specified.

B. Notify the Engineer of conflicts between the manufacturer's instructions and installation or connection details prior to the installation of materials.

1.14 WORKMANSHIP

A. Firmly and permanently secure in place all electrical equipment to the structure so that it is level, plumb, and true with the structure and other equipment. Installation methods shall be as recommended by the National Electrical Contractors' Standard of Installation, except

when methods specified or shown on the plans differ. The minimum installation standards shall be as required by the Codes.

1.15 PROTECTION

A. Protect all equipment and materials required for the performance of this work from damage by the elements, vandalism, or work during construction.

1. Do not subject the work and materials of other trades to damage during execution of the work in this division of the specifications.

1.16 COORDINATION WITH OTHER TRADES

A. Coordinate with other trades and promptly transmit all information required by them. Coordinate the sequence of construction with other trades to ensure that all work proceeds with a minimum of interference and delay. Perform all work that requires relocation due to negligence or absence of regard for the work of other trades.

1.17 EXAMINATION OF SITE

A. Examine the site prior to bid to determine existing site conditions that may affect the work. No allowance will be allowed for any extra work required due to a failure to recognize, or negligence to discover conditions prior to bid.

1.18 STRUCTURAL REQUIREMENTS

A. Secure all anchors for electrical equipment in a manner that will not decrease the structural value of any structure to an unsafe level. Inform the Engineer of any proposed modifications to the structure that involves cutting or patching of concrete, masonry, steel, or wood in the project.

1.19 IDENTIFICATION

A. Install nameplates on electrical equipment including:

1. Individual circuit breakers on switchboards, distribution panelboards and motor control centers.

2. Motor starters.

3. Pilot lights, selector switches, overload resets, timers and other pilot control devices.

4. Panelboards, switchboards, transformers, control cabinets and other major equipment.

5. Disconnect switches, time switches, contactors, relays and other miscellaneous equipment enclosures.

6. Light switches for which the control functions are not evident.

7. Provide labeling on receptacles and light switches which describe the source panel and circuit number. Use clear adhesive label with typed text. Example, "EH-3", that is panel "EH" circuit 3.

B. Describe item, control function of sequence or operation on each nameplate, as applicable.

C. Fabricate nameplates of laminated phenolic plastic, black front and back with white core. Bevel edges. Engrave through outer layer to produce white letters and numerals. For control pilot devices, engraved metallic plates, filled with enamel, are acceptable. Fasten nameplates to equipment with No. 4 Phillips, round head, cadmium steel, self-tapping screws.

1.20 TESTS AND REPORTS

A. Perform routine insulation-resistance, continuity, equipment settings and rotation tests for all affected distribution and utilization equipment prior to and in addition to tests performed by the testing firm specified herein. Prepare inspection and test reports for all equipment as specified herein and submit to the Electrical Engineer for review and approval. Submit at least two weeks before the planned testing. Perform these inspections and test prior to or as part of system Acceptance Testing. Examples include:

1. Grounding systems, for resistance to earth. Provide additional grounding electrodes if main service or separately derived system ground resistance exceed 5 ohms.

2. Motor circuits with motor disconnected, for resistance to ground.

3. Control circuits for resistance to ground.

4. Lighting circuits, for resistance to ground.

5. Power feeders, for resistance to ground.

6. Switchboards, Motor Control Centers for resistance to ground.:

7. Main bus, power and control circuits, for resistance to ground.

    a. Check connection; tighten if necessary.

    b. Operation of each device.

    c. Set relays and trip settings in accord with the Engineer's directions.

    d. Check thermal overload heaters for size and reset operation.

8. Prior to energization of equipment, check the insulation resistance of listed circuits, with a 500-volt "Megger".

9. Set circuit protective devices to provide proper long-time, short-time and ground-fault tripping coordination

10. Coordinate phase rotation of all motors with installer to ensure proper direction of rotation. List motor data:

    a. Item of equipment.

    b. Nameplate data.

c. Overload heater catalog number and rating.

1.21 DEMONSTRATIONS:

A. After testing and final inspection, demonstrate operation of all affected systems and equipment to Engineer and Owner.

B. Arrange date of test with Owner.

C. Advise the manufacturers' representative to be present when required.

D. Instruct Owner's personnel in operation, adjustment and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

1.22 GUARANTEE:

A. Guarantee the electrical work against defects in work or materials for one year after filing of Notice of Completion.

B. Undertake repairs within 24 hours after notice from the Owner.

C. If the operation of the electrical system fails to conform to Division 26 requirements, approved submittals, or operation and maintenance manuals, the Owner may operate the electrical system without liability to Owner. Repair or replace defective or unsatisfactory equipment or systems.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EQUIPMENT MOUNTING SEISMIC CRITERIA

A. Brace or anchor all electrical equipment to resist a horizontal force acting in any direction using the criteria of Section 1613A and 1615A, 2019 California Building Code, Title 24, Part 2.

B. Where anchorage details are not shown on the drawings, the field installation shall be subject to the approval of the electrical and structural engineers.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This specification defines the seismic design criteria to be used for the design of equipment anchorage and seismic bracing for electrical equipment/components. This section provides guidelines and limitations for supporting all electrical items from the building structure, and for seismic bracing for all such items.

B. The Contractor is responsible for engaging the services of a qualified licensed professional engineer in the state of California with a minimum 5 years of experience in structural seismic design to provide the analysis, calculations, seismic bracing, and installation details for equipment and equipment anchorage, skids and frames in accordance with specified criteria and applicable codes. The Contractor's engineer is to provide construction support during the equipment installation for any field problem that may arise during construction. The Contractor is required to design support and bracing for items for which the contract documents do not provide specific attachment, support, and bracing.

C. Unless the item is classified by the owner as essential, seismic bracing and restraint may be waived for the following.

1. Anchorage for equipment with operating weighs less than 400 pounds and is supported at 4 feet or less above the floor.

2. Temporary or movable equipment when rolling/sliding is prevented and is not subject to tipping.

3. Equipment weighing less than 20 pounds supported on vibration isolators.

4. Equipment weighing less than 20 pounds suspended from the floor or roof or mounted to walls.

5. Verification and investigation on Item C.2, whether the equipment will be tipped over under the code required seismic forces using R=1.0 and 60% of the operating weight, shall be performed by a qualified engineer per Paragraph 1.01B.

D. Seismic bracing is not required for the following items:

1. All electrical conduits less than 2.5 inches inside diameter, unless racked together.

2. All conduits mounted less than 12" from hanger anchorage.

E. Design and install all support and bracing systems except as noted. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design systems to not overstress the building structure

1.02 RELATED REQUIREMENTS

A. Section 26 01 00: General Requirements for Electrical Work.

B. Section 26 05 03: Seismic Certification of Equipment and Non Structural Components.

1.03 REFERENCES

A. California Building Code (CBC), with local amendments where the project is located.

B. American Society of Civil Engineers (ASCE), ASCE 7, Minimum Design Loads for Buildings and Other Structures,

C. American Society of Heating and Ventilating and Air Conditioning (ASHRAE), HVAC Applications, Latest Edition, Seismic and Wind Restrain Design

1. The lateral force equations in ASCE 7, as appropriate, should be used to determine the lateral seismic force. The force calculations found in these standards are based on a previous code provision that may not comply with the latest ASCE 7.

D. American Society of Mechanical Engineers (ASME), including addendum through the latest edition

E. Structural Engineers Association of California, Recommended Lateral Force Requirements and Commentary, Latest Edition

F. Seismic Restraint Manual Guidelines for Mechanical Systems, Latest Edition (SMACNA)

1.04 SYSTEM DESCRIPTION

A. Site Criteria: Obtain the required parameters from the Structural Specifications/Structural Engineer of Record.

B. Design Requirements

1. All electrical equipment/devices, attachments and supports shall be designed to withstand the specified seismic loads and comply with the latest ASCE 7 seismic design detailed requirement for strength and displacement.

2. Equipment design is solely the responsibility of the equipment supplier. The equipment shall be designed so the strength and anchorage of the internal and external components or equipment piping exceed that of the forces used to restrain and to anchor the equipment to the supporting structure. Guidance as to which pieces of equipment and parts require seismic design can be found in the commentary section of SEAOC Recommended Lateral Force Requirements and Commentary, specifically Section C107. Equipment with flexible and /or cantilevered lateral system shall be avoided.

3. Seismic design parameters as defined by the latest ASCE 7.

a. Rp for anchorage shall consider the ductility and the embedment depth of the anchor.

b. Additional factor for anchorage to cracked concrete and masonry structure shall be applied as required by codes.

4. Components and Equipment Supported by Structures

a. The lateral force is to be applied at the center of mass of the component and can

act in any lateral direction.

5. Seismic restraint for electrical system is to be designed per the latest ASCE 7 - seismic design requirements.

C. Connection Requirements

1. Component attachments are to be welded, bolted, or otherwise positively connected without consideration of frictional resistance resulting from gravity loads. Do not weld on any joists or beams without written approval from Structural Engineer.

2. Attachments to concrete shall be made with anchors suitable for cyclical loads. Expansion or chemical anchors not rated for Seismic Design Category “D”, “E” & “F” shall not be used for seismic anchorage.

3. Powder driven fasteners shall not be used for tension load applications.

4. Friction clips shall not be used for anchorage.

5. Welded plate washers with standard holes shall be used at bolted connections with oversized holes on the base plate.

6. Unless the base sheet metal is reinforced with stiffeners and is designed to take the bending from the uplift forces, oversized plate washers shall be used at bolted connection through the base sheet metal

7. Isolators must be designed to withstand the seismic loads. Provide snubbers if the isolator cannot withstand the specified load and see below for the design force.

8. Components mounted on vibration isolator system shall have a bumper restraint or a snubber in each horizontal direction. The design force is to be taken as 2Fp unless the nominal clearance (air gap) between the frame and restraint is equal or less than 0.25”.

D. Refer to structural drawings for material specifications of structure. If no structural drawings are available, assume 3000 psi concrete and ASTM A36 steel for attachment design and confirm these values with Structural Engineer before proceeding with the design

1.05 SUBMITTALS

A. Calculations and Drawings.

1. Submit structural calculations and a separate drawing stamped and signed by the California Licensed Professional Engineer in good standing. The calculations and drawings shall include the following information as minimum:.

a. Empty weight

b. Operating weight

c. Center of mass in plan

d. Center of mass in elevation

e. Seismic vertical, lateral, and overturning loads

f. Load combinations in accordance with applicable codes

g. Anchor bolt brand, type, size, embedment depth in concrete, grip distance, and locations, including specific drilling and special inspection requirement

h. Installation sequence if it requires specific sequence to fasten the anchorage

2. Coordination drawings to demonstrate interface with adjacent systems including location and space required for seismic bracing and anchorage.

3. Furnish certification letter in the calculations stating the design of the equipment components and anchorage comply with the seismic design requirement per ASCE 7 13.2.2.a. and applicable local building codes.

B. Installing contractor to submit following reports to Structural Engineer and Building Official

1. Bolt inspection reports for field installed bolts for structural components including the location of the test, date of the test, bolt diameter, and recorded torque.

2. Reports covering other structural activities requiring inspection in accordance with the applicable local building codes.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Furnish all substructures and fasteners required to comply with the limitations given below. Use materials as specified in the various sections and as appropriate to the use.

B. All exterior materials: Hot dipped galvanized or stainless steel.

PART 3 - EXECUTION

3.01 GUIDELINES & LIMITATIONS

A. Coordinate with the Structural Engineer of Record for criteria.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide electrical materials, installation and testing for the improvement in Lodi Middle School

1.02 DESCRIPTION

A. This section describes requirements for wire and cable.

1.03 RELATED WORK

A. Section 26 01 00: General Requirements for Electrical Work.

1.04 REFERENCE STANDARDS

A. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

1.05 SUBMITTALS

A. Provide submittals for items listed documenting compliance with specification requirements.

B. Product Data:

1. Electrical Materials: Manufacturer’s current published catalog sheets, and samples of product as required.

PART 2 - PRODUCTS

2.01 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of CEC.

B. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.

C. Provide conductors and cables with lead content less than 300 parts per million.

D. Provide new conductors and cables manufactured not more than one year prior to installation.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

F. Comply with NEMA WC 70.

G. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

H. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

I. Conductors and Cables Installed Exposed in accessible above ceiling space (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

J. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.

3. Tinned Copper Conductors: Comply with ASTM B33.

K. Minimum Conductor Size:

1. Branch Circuits: 12 AWG. Compensate size for voltage drop as required by governing codes.

2. Control Circuits: 14 AWG.

L. Conductor Color Coding:

1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.

2. Color Coding Method: Integrally colored insulation.

3. Color Code:

a. 208Y/120 V, 3 Phase, 4 Wire System:

1) Phase A: Black.

2) Phase B: Red.

3) Phase C: Blue.

4) Neutral/Grounded: White.

b. 480Y/277 V, 3 Phase, 4 Wire System:

1) Phase A: Brown.

2) Phase B: Orange.

3) Phase C: Yellow.

4) Neutral/Grounded: Gray.

c. Equipment Ground, All Systems: Green.

2.02 WIRE AND CABLE

A. Conductor: Insulated copper, individual conductors, 98 percent conductivity, stranded.

1. Power conductors, #12 AWG, minimum to 750 MCM, stranded.

2. Control conductors #14 AWG, minimum to #10 AWG, stranded.

B. Insulation:

1. Rated 600 volts as follows:

2. THHN/THWN-2

Item	Size	Insulation Type
Branch Circuits (except wet locations)	#12 to #4/0	THHN/THWN-2
Underground Branch Circuits	#12 to #4/0	XHHW-2 or THWN-2
Fixture Taps	#12	XHHW-2 or THHN/THWN-2
Feeders (except wet locations)	#12 to #4/0	THHN/THWN-2
	To #750 MCM	USE-2, or XHHW-2
Underground Feeders	#12 to #750 MCM	XHHW-2
Grounding	All	THHN/THWN-2
Control Interconnect	#14 to #10	THHN/THWN-2
Control Cabinets	#14	THHN/THWN-2

2.03 WIRE CONNECTIONS

A. Connect wire to binding post screw, stud, bolt or bus as follows:

1. #10 AWG and smaller conductors, compression type, nylon, self-insulated grip spade lugs, T & B "Sta-Kon", Buchanan "Termend", Panduit "Pan-Term", or equal.

2. #8 AWG to #750 MCM copper conductors, solderless lug type connectors, with hex-head or allen type compression set screws with configuration to suit application, T & B "Locktite", Burndy "QA", OZ Type "XL" or "XLH", or equal.

B. Conductor Taps: #8 through #4 copper conductors, split-bolt, Kearney.

C. Splice wire as follows:

1. #10 AWG and smaller conductors, twist-on solder-less, insulated spring connectors, 3M "Scotchloks", T & B "Piggys" or equal.

2. #8 AWG to #750 MCM copper conductors, two-way connectors, OZ type "XW", Burndy or equal.

3. In underground pull-boxes, cast resin epoxy, Scotch.

D. Size, install and tighten wire terminal and splice connectors in accordance with manufacturer's recommendations.

2.04 TAPE

A. Wire Splices: Vinyl plastic electrical tape, 8.5-mil and 4.0-mil, Scotch 33.

B. Conduit Wrapping: 10-mil vinyl wrapping tape, Manville, Minnesota Mining and Manufacturing Company.

2.05 WIRING ACCESSORIES

A. Identify conductors with self-adhesive vinyl cloth markers, sized to fit the conductor insulation, with machine printed black marking, W.H. Brady, Thomas and Betts, or equal.

PART 3 EXECUTION

3.01 INSULATED CONDUCTORS AND CABLE

A. Exercise extreme care when pulling conductors and cable into conduits to avoid kinking, twisting, nicking or scratching of the insulation or the placement of extreme stress on the conductors or cable. When required, utilize UL approved pulling compounds to assist in pulling conductors.

B. Color code conductors by phase sequence A-B-C when looking into the front of the equipment from left-to-right, top-to-bottom or front-to-back. Provide conductors with the appropriate phase color or mark conductors with a minimum of 6 inches of phase tape on ends connected to terminals. Phase code conductors as listed:

Voltage	Phase A	Phase B	Phase C	Neutral	Ground
120/208	Black	Red	Blue	White	Green
277/480	Brown	Orange	Yellow	Gray	Green

C. Identify all conductors with their respective circuit numbers at all boxes and terminals.

D. For medium voltage cables, do not exceed manufacturer's recommendations for maximum allowable pulling force. Where wire and cable-pulling compound is used, use UL listed compounds only. In all cases, limit pulling tension to the following:

1. Applied to Conductors: 0.008 pounds per circular mil of conductor cross sectional area.

2. Applied to Nonmetallic Jacket: 1,000 pounds, but not exceeding pulling force specified above for conductor.

E. Connections:

1. Use twist-on solder-less connectors for splicing receptacle and lighting circuits #10 AWG wire size and smaller.

2. Splice #12 and #10 AWG stranded conductors with compression connectors.

3. Terminate conductors at motors with bolted connections, insulated with plastic tape.

4. For conductor taps #8 through #4 AWG, provide split bolt service connectors.

5. For splices larger than #10 AWG, insulate and smooth the splice with insulation putty, tape with one half-lapped layer of 8.5-mil vinyl plastic electrical tape and two half-lapped layers of 7.0-mil vinyl plastic electrical tape.

6. Use cast resin epoxy splices for splices in underground pullboxes.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2016.

B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

C. CEC - California Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.03 SUMMARY

A. This section describes requirements for grounding of the power and communications systems.

1.04 DESCRIPTION

A. Provide all equipment and materials for a complete grounding system.

1. Power System Grounding.

2. Communications System Grounding.

3. Electrical Equipment and Raceway Grounding and bonding.

1.05 RELATE REQUIREMENTS

A. Section 26 01 00: General Requirements for Electrical Work.

1.06 REFERENCE STANDARDS

A. National Electrical Manufacturers Association (NEMA).

B. American National Standards Institute (ANSI).

1.07 SUBMITTALS

A. Submit a complete set of marked-up record drawings to indicate installed location of system grounding electrode connections, and routing of grounding electrode conductor.

B. Submit certified test results stating ground resistance from service neutral at service entrance and separately derived systems.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with CEC but not less than applicable minimum size requirements specified.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in addition to requirements of Section 26 05 19:

1. Use insulated copper conductors unless otherwise indicated.

a. Exceptions:

1) Use bare copper conductors where installed underground in direct contact with earth.

2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.

3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

2.03 ACCEPTABLE MANUFACTURERS

A. Thomas and Betts Appleton, Raco, Oz Gedney, Blackburn, or approved equal.

2.04 MATERIALS

A. Ground Rods: Copper encased steel, 5/8 inch diameter, minimum length - 8 feet.

B. Ground Clamp: Water pipe connection, bronze two piece with serrated jaws, lug sized for grounding electrode conductor.

C. Connectors, Compression Type: Bronze or Copper, pretreated with conductive paste, sized for conductor to which applied.

D. Connectors, Exothermic Weld Type: Powder actuated weld. Bond made through exothermic reaction producing molten copper from premixed copper oxide and aluminum powder. Form bond in mold or crucible.

2.05 COMMUNICATIONS GROUNDING SYSTEM

A. All intermediate distribution frame (IDF) and main distribution frame (MDF) rooms shall have a Telecommunication Ground Bus Bar installed. Refer to drawings for specific size and assembly.

B. The telecommunication service entrance MDF, shall have a minimum of a #2 AWG conductor with green outer sheath installed to the Telecommunication Ground Bus Bar located in the room.

C. Except where specifically indicated otherwise, all facility MDFs shall have a minimum of a #4 AWG conductor with green outer sheath installed to the Telecommunication Ground Bus Bar located in each room.

D. Except where specifically indicated otherwise, all facility IDFs shall have a minimum of a #6 AWG conductor with green outer sheath installed to the Telecommunication Ground Bus Bar located in each room.

2.06 GENERAL BRANCH CIRCUITS GROUNDING

A. All grounding conductor wire shall be insulated green copper conductors.

B. All conduit bushings shall be grounding type.

C. All grounding connections shall be made with solderless lugs and nonferrous hardware.

2.07 CONDUIT BANK GROUNDING

A. Provide a size 4/0 AWG bare copper grounding conductor for each of the campus utility distribution conduit banks shown on drawings. Install this grounding conductor within the ground floor slab and parallel to the respective conduit bank.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with CEC or provide ground plates.

1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.

2. Indoor Installations: Unless otherwise indicated, install with 4 inches (100 mm) of top of rod exposed.

D. Ground Plate Electrodes: Unless otherwise indicated, install ground plate electrodes at a depth of not less than 30 inches (750 mm).

E. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.

2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.

4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

F. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. Perform inspection in accordance with Section 01 4000.

B. Inspect and test in accordance with NETA STD ATS except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 EXISTING GROUND SYSTEM

A. Test and inspect existing building ground. Replace damaged and corroded parts and pieces. Also replace parts wich do not confirm to this specifications.

B. Provide additional ground rod(s) it existing ground test exceed 5 ohms.

3.05 GENERAL BRANCH CIRCUITS AND FEEDERS

A. All conduit systems, equipment housings, material housings, junction boxes, cabinets, motors, ducts, wireways, cable trays, light fixtures, portable equipment and all other conductive surfaces shall be solidly grounded in accordance with the California Electrical Code to form a continuous, permanent and effective grounding system.

B. Install a separate green grounding conductor in all conduits, including feeder, branch circuit, and flexible; both metallic and non-metallic. The conduit systems shall not be used as the system equipment grounds. Size all grounding conductors per CEC Article 250 unless a larger ground is indicated on the drawings.

C. All panelboards, junction boxes, pullboxes, wireways and equipment enclosures shall be bonded to the conduit systems.

D. All building expansion joints shall be bonded.

E. Isolated ground receptacles shall have both an isolated ground conductor and a separate equipment grounding conductor.

3.06 MOTOR CIRCUITS

A. All motor circuits shall have a ground wire pulled with the phase conductors. The ground wire shall be extended from the panel ground bus and shall be bonded at all junction boxes, pullboxes, disconnect switches, controllers, motor connection boxes, and motor frames. Each motor with a Variable Frequency Drive (VFD) controller shall have a dedicated grounding conductor. Ground these motors back through the VFD controller as recommended by the drive manufacturer to eliminate radio frequency interference. Also, the wiring between the VFD controller and the motor shall be in a dedicated conduit.

3.07 SEPARATELY DERIVED SOURCES

A. All secondary neutrals for the 120/208 volt wye services of dry type transformers shall be grounded to building steel. Connection shall be made with cable sized according to Table 250-94(a) of the California Electrical Code. Extend separately derived insulated ground to the transformer in rigid steel conduit.

3.08 EQUIPMENT ROOM GROUND TERMINAL BAR

A. Mount bar by anchors and bolts using 1-1/2 inch long segments of 1/2 inch rigid conduit as spacer between bar and wall. Use a minimum of two supports, 18 inches on center. Connect all grounding electrode system conductors, system enclosure ground bus, and other indicated electrode systems to the terminal bar. Each telecom/his room shall have a ground bar with a minimum of six lugs or screws. Interconnect telecom/his ground bars to building steel with No. 6 AWG insulated copper conductor.

3.09 FLEXIBLE RACEWAY GROUNDING

A. Install a ground conductor inside all flexible raceways (e.g. flexible steel, liquid tight). Bond the conductor to the enclosure or ground bus in the nearest box or access on either side of the flexible section. Size conductor as specified, indicated or required by code, whichever is larger.

3.10 GENERAL GROUNDING REQUIREMENTS

A. All ground connectors shall be bronze of the clamp type. All clamp accessories such as bolts, nuts, and washers shall also bronze to assure a permanent corrosion-resistant assembly. Connector shall be as manufactured by Burndy Engineering Company, Ilsco Corporation, or equal. Make connections easily accessible for inspection, underground or concealed in floors or walls.

B. All ground cable splices, joints, and connections to ground rods shall be made with an exothermic welding process which shall provide a weld with current-carrying capacity not less than that of the conductors welded. Soldered connections shall not be used.

C. All ground wire shall be insulated, unless otherwise indicated on the Drawings, extra flexible stranded copper cables. Grounding cables installed in earth shall be laid slack.

D. Neutrals throughout the system shall be solidly grounded.

E. Lighting and power panelboards shall be grounded by connecting a grounding conductor to the grounding stud and to the incoming and outgoing feeder conduits grounding bushings. Each grounding-type bushing shall have the maximum ground wire accommodation available in standard manufacturer for the particular conduit size. Connection to the bushing shall be with wire of this maximum size.

F. The equipment for the fire protection alarm system shall have its grounding terminal connected to the ground lug on the panelboard serving the system by means of a #6 green coded insulated conductor, run in 3/4 inch steel conduit, utilizing a ground clamp.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2011.

D. MFMA-4 - Metal Framing Standards Publication; Metal Framing Manufacturers Association; 2004.

E. California Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 SUMMARY

A. Provide electrical materials, installation and testing for the remodeling in Lodi Unified School District Food Service Operation Center Builidng.

1.03 DESCRIPTION

A. This section describes requirements for supporting devices.

1.04 RELATED WORK

A. Section 26 01 00: General Requirements for Electrical Work.

1.05 SUBMITTALS

A. Provide submittals for items listed documenting compliance with specification requirements.

B. Product Data:

1. Electrical Materials: Manufacturer’s current published catalog sheets.

PART 2 - PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated, where applicable.

3. Do not use products for applications other than as permitted by CEC and product listing.

4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.

   a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

   b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

1. Conduit Straps: Two-hole type; steel or malleable iron.

2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2.02 SUPPORTING DEVICES

A. Conduit Supports:

1. Straps, one hole galvanized or cadmium plated iron, T & B, Efcor, Appleton, or equal.

2. Clamp backs, nest backs, galvanized iron or cadmium-plated steel, Efcor, OZ, Steel City, or equal. Plumbers perforated strap, not acceptable.

3. Hanger Rod, 3/8-inch, minimum galvanized all-thread rod.

B. Conduit Racks:

1. Framing Channel, steel, hot-dip galvanized or electroplated, Kindorf, Unistrut, Superstrut, or equal.

2. Channels attached to building or structure surfaces, 14 gauge, 1-5/8 inches wide by 13/16 inches deep. Other channels, 12 gauge minimum, 1-5/8 inches wide by 1-5/8

inches deep, minimum.

3. Construct racks to limit deflection to 1/360 of span.

4. Load on trapeze, rod type hangers, concrete inserts and beam clamps, not to exceed 700 pounds per hanger. Provide rigid frames if load exceeds 700 pounds per hanger.

C. Outlet Boxes

1. Attach device boxes with adjustable bar type hangers screw fastened to two stud/ceiling joists on both sides of box.

D. Anchor Methods:

1. Hollow masonry anchors.

2. Solid masonry, malleable iron expansion anchors or preset inserts.

3. Metal surfaces, machine screws, bolts or welded studs.

4. Wood surfaces, wood screws.

5. Concrete surfaces or self-drilling anchors.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section describes requirements for conduit raceways.

1.02 RELATED WORK

A. Section 26 01 00: General Requirements for Electrical Work.

B. Section 26 05 26: Grounding and Bonding.

C. Section 26 05 02: Supporting from Building Structure

D. Section 26 05 29: Hangers and Supports for Electrical Systems

E. Section 27 10 13: Structured Cabling Systems

1.03 REFERENCE STANDARDS

A. American National Standards Institute (ANSI):

1. C80.1Specification for Rigid Steel Conduit, Zinc Coated

2. C80.3Specification for Electrical Metallic Tubing, Zinc Coated

B. National Electrical Manufacturers Association (NEMA):

1. TC 2 Electrical Plastic Tubing (EPT), Conduit (EPC-40 and EPC-80) and Fittings

C. Underwriters Laboratories, Inc. (UL):

1. 1242 Intermediate Metal Conduit

D. Federal Specifications:

1. WW-C-581E Conduit, Metal Electrical Conduit. Steel, Zinc Coated

1.04 SUBMITTALS

A. Procedure: Submit under provisions of Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements.

B. Provide submittals for items listed documenting compliance with specification requirements.

1. Product Data:

2. Electrical Materials: Manufacturer’s current published catalog sheets.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Rigid Steel Conduit:

1. ANSI C80.1, minimum size 3/4 inch.

2. Threaded fittings, galvanized.

3. Locknuts, 3/4 inch to 1-1/2 inch, heavy nut steel.

4. Locknuts, 1-1/2 inch and larger, malleable iron.

5. Insulated bushings, malleable iron, plastic or nylon insert, OZ "IBC" series, Efcor "56" series, Appleton "GIB" series or equal.

6. Three-piece conduit couplings, malleable iron, T & B "Erickson", Appleton "EC" series, OZ "4" series, or equal.

B. Intermediate Metal Conduit (IMC):

1. Conform to UL 1242 and Federal Specification WW-C-581E, minimum size 3/4 inch.

2. Fittings: As specified for rigid steel conduit.

C. Electrical Metallic Tubing (EMT):

1. Galvanized rolled steel ANSI C80.3.

2. Fittings to 2 inch, rain-tight compression gland, steel, plated with zinc or cadmium, for wet locations and setscrew steel for dry locations.

3. Couplings, to 2 inch:

   a. Compression type: OZ "6050S" series, T & B "5120" series, Efcor "760" series, or equal.

   b. Setscrew type: OZ "5050S" series, Steel City "TK121" series, Efcor "730" series, or equal.

4. Connectors, insulated throat:

   a. Compression type: OZ "7050 ST" series, T & B "5123" series, Efcor "750B" Series, or equal.

   b. Setscrew type: OZ "4050 ST" series, Steel City "TC721" series, Efcor "720B" Series, or equal.

5. Couplings, 2-1/2 inch to 4 inch, set-screw, four screw, steel plated with zinc or cadmium, OZ "5250S" series, T & B "5042" series, Efcor "736" series, or equal.

6. Connectors, 2-1/2 inch to 4 inch, insulated throat, set-screw, two screw, plated with zinc or cadmium, Appleton "TW250 SI" series, Efcor "726B" series, or equal.

7. Adapter, EMT to rigid steel, zinc or cadmium plated malleable iron, OZ, T & B, Efcor, or equal.

8. Maximum size, 2 inch, except for Telephone, 4 inch.

D. Flexible Metal Conduit:

1. Fabricate from galvanized steel strip, minimum size 1/2 inch.

2. Connectors, T & B "Tite Bite", with insulated throat, or equal.

3. Length, no greater than 6 feet. Allow slack for movement of connected equipment.

E. Liquid-tight Flexible Metal Conduit:

1. Fabricate from galvanized steel strip, jacketed with PVC, minimum size 1/2 inch.

2. Straight connectors, cadmium plated steel or malleable iron, insulated throat and neoprene sealing ring, OZ "4Q-IT" series, T & B "5330" series, Efcor "11-B" series, or equal.

3. Angle connectors, cadmium plated steel or malleable iron, insulated throat and neoprene sealing ring, OZ, T & B, Efcor, or equal, comparable to straight connectors.

4. Hardware, cadmium plated steel.

5. Length, no greater than 6 feet. Allow slack for movement of connected equipment.

F. PVC Conduit:

1. Schedule 40, NEMA TC2, Type II underground installation.

a. Minimum size, 1 inch.

b. Elbows, Schedule 40, encased in concrete for sizes 2-inch and larger.

c. Extensions above grade, rigid steel (exposed), EMT (concealed indoors).

d. Adapters, PVC to rigid steel, threaded plastic.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Conduit Support:

1. Secure and support conduits in accordance with CEC and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Connections and Terminations:

1. Use suitable adapters where required to transition from one type of conduit to another.

2. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

3. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

E. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.

2. Make penetrations perpendicular to surfaces unless otherwise indicated.

3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.

4. Conceal bends for conduit risers emerging above ground.

5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.

6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.

7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.

8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

F. Conduit Movement Provisions: Where conduits are subject to thermal expansion, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. Where conduits are subject to seismic movement, provide 6 feet max. flex conduit with grounding fittings on each end bonded with #6 green wire. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection (seismic expansion joint).

G. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.

2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

H. Provide grounding and bonding in accordance with Section 26 0526.

I. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with CEC.

3.02 ABOVE GROUND RACEWAY SYSTEMS

A. Install all wiring in raceways. Install raceway systems, including conduits, hangers and support channels parallel or perpendicular to structural members in accordance with Section 26 05 29 Hangers and Supports for Electrical Systems and 26 05 02 Supporting from Building Structures. Coordinate location of raceway systems with other Divisions prior to commencing installation.

B. Rigid Steel Conduit: Suitable for use in all locations.

C. Intermediate Metal Conduit: As specified for rigid steel.

D. Electrical Metallic Tubing: Suitable for use in concealed dry locations, not in concrete, masonry, or underground, and suitable exposed, minimum 8 feet above finished floor.

E. Flexible Metal Conduit: Suitable for connection of recessed lighting fixtures, motors or other devices requiring flexible connections in dry locations.

F. Liquid-Tight Flexible Metal Conduit: Suitable for connection of motors and equipment in damp or wet locations.

G. Conduit Supports:

1. Support all conduits at intervals per Chapter 3 of the CEC for the selected raceway type (not to exceed 10-feet).

2. Support individual conduits with conduit hangers or clamp back and nest back, if required for entrance into the equipment.

3. Support multiple conduits, 2 or more in parallel, with framing channel and pipe clamps.

4. Spring steel fasteners may be used to fasten electrical metallic tubing to individual hanger wires, minimum #12 AWG, specifically used for hanging conduit, nothing else.

H. Conduit Bends:

1. Provide no more than (3) 90-degree conduit bends or the equivalent number of smaller radius bends in any conduit run between boxes or equipment.

2. Length of run: 400-feet maximum less 100-feet for each equivalent 90 degree bend.

3. Fabricate bends and offsets with a hickey or conduit bender designed specifically for use with the type of conduit to be bent, or use factory made bend.

4. Radius of Bends: Conduits 2" inside diameter or less the inside bend radius shall be at least 6 times the diameter. Conduits greater than 2" diameter the inside bend radius shall be at least 10 times the conduit diameter.

I. Cap conduits during construction to prevent entrance of foreign material.

J. Provide conduit-sealing bushings at conduit penetrations through exterior walls to seal against fluid and gas pressure around the conduit.

K. Fit all conduits that enter the enclosure of a switchboard, distribution panel, or motor control center with an insulated grounding bushing.

L. Install pull ropes in all empty conduits, #12 AWG in conduits 1 inch and smaller and 3/16 inch polypropylene rope in conduits 1-1/4 inch and larger.

3.03 UNDERGROUND RACEWAY SYSTEMS

A. Install all wiring in raceways. Coordinate location of raceway systems with other Divisions prior to commencing installation. Provide excavation, clearances from other utilities, encasing, trenching, boring, backfill, compaction, patching, per Division 31 Site Preparation. Provide conduits per drawings.

B. EXCAVATING AND BACKFILLING

1. Excavate and backfill as required for installation of electrical work. Maintain all warning signs, barricades, flares and lanterns as required by the Safety Orders and local ordinances.

2. Excavation: Dig trenches straight and true to line and grade, with bottom clear of any rock points. Support conduit for entire length on undisturbed original earth. Backfill: All backfill material shall be local material free of rubble, rubbish or vegetation. Trenches shall be backfilled and compacted to 90% of maximum dry density at optimum moisture content in layers not to exceed 6" when compacted.

3. Minimum Coverage (depth) - Per CEC Table 300.5

4. Area of Influence- Do not install conduits parallel to building footings in the area of influence. See structural drawings and specifications for the area of influence and the methods that conduits can cross a footing.

5. Drain Slope- Underground conduit shall be installed such that a .125" per foot min. slope exists at all points of the run to allow drainange and prevent the accumulation of water. Provide a drain slope of greater than .125" per foot when extending conduit away from a building.

6. Provide underground warning tape along entire conduit length.

C. CUTTING AND PATCHING

1. Provide necessary cutting and patching required to accomplish the work of Division underground 26. Restore all surfaces, roadways, sod, walks, curbs, walls, existing underground installation, etc., cut by installations to original condition in an acceptable manner.

D. Conduit Bends:

1. Provide no more than (3) 90-degree conduit bends or the equivalent number of smaller radius bends in any conduit run between boxes or equipment.

2. Length of run: 400-feet maximum less 100-feet for each equivalent 90 degree bend.

3. Fabricate bends and offsets with a hickey or conduit bender designed specifically for use with the type of conduit to be bent, or use factory made bend.

4. Radius of Bends: Conduits 2" inside diameter or less the inside bend radius shall be at least 6 times the diameter. Conduits greater than 2" diameter the inside bend radius shall be at least 10 times the conduit diameter.

E. Rigid Steel Conduit: Suitable for use in all locations. Where used underground, wrap with no less than 2 layers of half-lapped 10 mil vinyl pipe wrapping tape, Manville, Minnesota Mining

F. PVC Conduit: Suitable for use underground, with a minimum of 18 inches of cover. Also suitable for use in concrete slabs (for healthcare facilities, use Schedule 80 PVC). Fabricate field bends with an approved thermal bender and jig. Maintain separation between conduits using plastic spacers specifically designed for the purpose.

G. Provide conduit-sealing bushings at conduit penetrations through exterior walls to seal against fluid and gas pressure around the conduit. Ducts shall be sealed to resist liguid and gas infiltration at all maintenance holes and building entrances.

H. Install pull ropes in all empty conduits, #12 AWG in conduits 1 inch and smaller and 3/16 inch polypropylene rope in conduits 1-1/4 inch and larger.

I. Fit PVC conduits that enter pullboxes and junction boxes with belled ends.

END OF SECTION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 26 27 26 - Wiring Devices:

1. Wall plates.

1.02 REFERENCE STANDARDS

A. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

B. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008 (Revised 2010) (ANSI/NEMA OS 1).

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

D. CEC - California Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

G. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

H. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.03 SUMMARY

A. Provide electrical materials, installation and testing for the interior improvements in Relocatable Building Houston Middle School.

1.04 DESCRIPTION

A. This section describes requirements for outlet boxes.

1.05 RELATED WORK

A. Section 26 01 00: General Requirements for Electrical Work.

1.06 REFERENCE STANDARDS

A. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.

B. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008.

C. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; National Electrical Manufacturers Association; 2008.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

1.07 SUBMITTALS

A. Procedure: Submit under provisions of Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements.

B. Provide submittals for items listed documenting compliance with specification requirements.

C. Product Data:

1. Electrical Materials: Manufacturer’s current published catalog sheets.

PART 2 - PRODUCTS

2.01 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by CEC and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.

3. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

4. Where box size is not indicated, size to comply with CEC but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.

2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

3. Use suitable concrete type boxes where flush-mounted in concrete.

4. Use suitable masonry type boxes where flush-mounted in masonry walls.

5. Use raised covers suitable for the type of wall construction and device configuration

where required.

6. Use shallow boxes where required by the type of wall construction.

7. Do not use "through-wall" boxes designed for access from both sides of wall.

8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.

9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.

12. Wall Plates: Comply with Section 26 27 26.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.

2. NEMA 250 Environment Type, Unless Otherwise Indicated:

3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):

a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

D. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.02 OUTLET BOXES

A. Construction: Deep drawn or fabricated interlocked flat pieces with welded tabs, electro-galvanized sheet steel with electro-galvanized hardware. Do not use sectional boxes.

B. Size: To accommodate the required number and sizes of conduits, wires, splices and devices but not smaller than the size indicated or specified.

C. Plaster Ring: Provide flush with wall or ceiling finish, except where otherwise indicated or specified.

D. Device Boxes: For single switches and receptacles, provide boxes not less than 4 inches square by 1-1/2 inches deep. For 2 devices, provide boxes not less than 4-11/16 inches square by 1-1/2 inches deep.

E. Telecommunications Boxes: No less than 4-11/16 inches square by 2 inches deep.

F. Special Mounting: In cabinets, tile, concrete block, brick, stone, wood or similar material, provide rectangular boxes with square corners and straight sides. For single devices, provide boxes 4 inches high by 2-1/2 inches wide by 3-3/8 inches deep. For 2 or more devices, provide multi-gang, non-sectional box with tile or masonry ring.

G. Lighting Fixtures: 4-inch octagon by 2-1/8 inch deep, minimum. Fit boxes for surface or pendant mounted fixtures with 3/8-inch malleable iron fixture stud.

H. Attach device boxes with adjustable bar type hangers screw fastened to two stud/ceiling joists on both sides of box.

2.03 PULL AND JUNCTION BOXES

A. General: For all pull and junction boxes over 300 cubic inches, provide code gauge, sheet steel boxes which meet NEMA 1 standards for panelboard and terminal cabinet box construction, with screw type covers.

B. Ground Lug: Weld, before finish is applied, a grounding pad drilled for two bolted grounding lugs or two ground studs on the box interior.

C. Finish: Apply rust inhibiting prime coat and 2 coats of baked enamel, standard factory gray.

D. Hardware: Cadmium plated steel screws.

PART 3 - EXECUTION

3.01 BOXES AND CABINETS

A. Place outlet boxes in a location as close to that shown on the plans as possible. Coordinate location of boxes with other Divisions.

B. Install wall mounted outlet boxes so that the distance from the centerline of the box to finished floor is as listed or indicated:

1. Receptacles, + 1 foot-6 inches

2. Telephone, + 1 foot-6 inches

3. Data, + 1 foot-6 inches

4. Switches, + 4 feet-0 inches

C. Install junction boxes with covers in concealed areas accessible after installation. Do not install junction boxes flush with finish walls or ceilings unless specifically approved by the Engineer.

D. Attach surface boxes with:

1. Steel or malleable iron expansion anchors in concrete or solid masonry.

2. Wood screws in wood.

3. Toggle bolts in hollow walls or masonry.

4. Machine screws, bolts or welded studs in steel.

E. Attach flush boxes with adjustable bar type hangers screw fastened to studs on both sides of the box.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.02 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2007.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2007.

C. NFPA 70E - Standard for Electrical Safety in the Workplace; National Fire Protection Association; 2018.

D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.03 DESCRIPTION

A. Extent of electrical identification work is as outlined by this specification.

B. Types of electrical identification work specified in this section include the following:

1. Buried cable warnings.

2. Electrical power, control and communication conductors.

3. Operational instructions and warnings.

4. Danger signs.

5. Equipment/system identification signs.

1.04 RELATED REQUIREMENTS

A. Section 26 01 00: General Requirements for Electrical Work.

1.05 QUALITY ASSURANCE

A. California Electrical Code (CEC) Compliance: Comply with CEC as applicable to installation of identifying labels and markers for wiring and equipment.

B. Underwriters Laboratories, Inc. (UL) Compliance: Comply with applicable requirements of UL Standard 969, "Marking and Labeling Systems", pertaining to electrical identification systems.

C. American National Standards Institute (ANSI) Compliance: Comply with applicable requirements of ANSI Standard A13.1, "Scheme for the Identification of Piping Systems".

D. National Electrical Manufacturer's Association (NEMA) Compliance: Comply with applicable requirements of NEMA Standard No's WC-1 and WC-2 pertaining to identification of power and control conductors.

1.06 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical identification materials and products.

B. Samples: Submit samples of each color, lettering style and other graphic representation required for each identification material or system.

PART 2 - PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.

a. Switchgear:

1) Use identification nameplate to identify load(s) served for each branch device.

b. Panelboards:

1) Identify ampere rating.

2) Identify voltage and phase.

3) Identify power source and circuit number. Include location when not within sight of equipment.

4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.

5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.

6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

c. Enclosed switches, circuit breakers, and motor controllers:

1) Identify voltage and phase.

2) Identify power source and circuit number. Include location when not within sight of equipment.

3) Identify load(s) served. Include location when not within sight of equipment.

d. Enclosed Contactors:

1) Identify ampere rating.

2) Identify voltage and phase.

3) Identify configuration, e.g., E.O.E.H. (electrically operated, electrically held) or E.O.M.H. (electrically operated, mechanically held).

4) Identify coil voltage.

5) Identify load(s) and associated circuits controlled. Include location.

2. Service Equipment:

a. Use identification nameplate to identify each service disconnecting means.

b. Use identification nameplate at each piece of service equipment to identify the available fault current and the date calculations were performed.

3. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.

4. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".

5. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.

a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches (76 mm) wide, painted in accordance with Section 09 9123 and 09 9113.

6. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.

a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).

b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not

operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

7. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.

B. Identification for Conductors and Cables:

1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.

2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

3. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.

C. Identification for Raceways:

1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet (6.1 m).

a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches (76 mm) wide.

1) Color Code:

(a) Fire Alarm System: Red.

2) Field-Painting: Comply with Section 09 9123 and 09 9113.

3) Vinyl Color Coding Electrical Tape: Comply with Section 26 05 19.

D. Identification for Boxes:

1. Use voltage markers to identify highest voltage present.

2. Use voltage markers or color coded boxes to identify systems other than normal power system.

a. Color-Coded Boxes: Field-painted in accordance with Section 09 9123 and 09 9113 per the same color code used for raceways.

1) Fire Alarm System: Red.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Materials:

   a. Indoor Clean, Dry Locations: Use plastic nameplates.

   b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.

3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.

   a. Use only for indoor locations.

2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).

2. Legend:

   a. System designation where applicable:

      1) Fire Alarm System: Identify with text "FIRE ALARM".

   b. Equipment designation or other approved description.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height:

   a. System Designation: 1 inch (25 mm).

b. Equipment Designation: 1/2 inch (13 mm).

5. Color:

a. Normal Power System: White text on black background.

b. Fire Alarm System: White text on red background.

D. Format for Control Device Identification:

1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).

2. Legend: Load controlled or other designation indicated.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 3/16 inch (5 mm).

5. Color: Black text on clear background.

E. Format for Fire Alarm Device Identification:

1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).

2. Legend: Designation indicated and device zone or address.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 3/16 inch (5 mm).

5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch (3 mm).

F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

C. Minimum Size:

1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.

2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).

3. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).

D. Legend:

1. Markers for Voltage Identification: Highest voltage present.

2. Markers for System Identification:

E. Color: Black text on orange background unless otherwise indicated.

2.05 NOT USED

2.06 FLOOR MARKING TAPE

A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches (76 mm) wide, with alternating black and white stripes.

2.07 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:

2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

2.08 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide electrical identification products of one of the following (for each type marker):

1. Almetek,
2. Brady, W.H. Company,
3. Calipico Inc.,
4. Cole-Flex Corporation,
5. Direct Safety Company,
6. George-Ingraham Corporation,
7. Griffolyn Company,
8. Ideal Industries, Inc.,
9. LEM Products, Inc.,
10. Markal Company,
11. National Band and Tag Company,
12. Panduit Corporation,
13. Seton Name Plate Company,
14. Tesa Corporation,
15. Or equal.

2.09 ELECTRICAL IDENTIFICATION MATERIALS

A. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, provide single selection for each application.

B. Color-Coded Plastic Tape:

1. Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils thick by 1-1/2 inches wide.

a. Colors: Unless otherwise indicated or required by governing regulations, provide orange tape.

C. Underground-Type Plastic Line Marker:

1. Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6 inches wide x 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable.

D. Cable/Conductor Identification Bands:

1. Provide manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type, either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification.

E. Plasticized Tags:

1. Manufacturer's standard pre-printed or partially pre-printed accident-prevention and operational tags, of plasticized card stock with matte finish suitable for writing, approximately 3-1/4 x 5-5/8 inches, with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording, e.g., DANGER, CAUTION, DO NOT OPERATE.

F. Self-Adhesive Plastic Signs:

1. Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application, e.g., 208V, EXHAUST FAN, RECTIFIER.

G. Colors: Unless otherwise indicated, or required by governing regulations, provide white signs with black lettering.

H. Baked Enamel Danger Signs:

1. General: Provide manufacturer's standard DANGER signs of baked enamel finish on 20-gauge steel; of standard red, black and white graphics; 14 x 10 inches size except where 10 x 7 inches is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording, e.g., HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH.

I. Engraved Plastic-Laminate Signs:

1. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, black face and white core plies (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2. Thickness: 1/8 inch, except as otherwise indicated.

3. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

2.10 LETTERING AND GRAPHICS

A. General: Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

PART 3 - EXECUTION

3.01 APPLICATION AND INSTALLATION

A. General Installation Requirements:

1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions, and requirements of CEC and OSHA.

2. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.

3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

B. Conduit Identification:

1. Where electrical conduit is exposed in spaces with exposed mechanical piping which is identified by color-coded method, apply color-coded identification on electrical conduit in manner similar to piping identification. Except as otherwise indicated use white as coded color for conduit.

C. Box Identification:

1. After completion, using an indelible wide tip marker, indicate on the cover of each junction and pull box the designation of the circuits contained therein, i.e., A-1, 3, 5. Use a black marker for normal power circuits a red marker for critical circuits, an orange marker for life safety circuits, and a green marker for equipment circuits.

2. All junction and pull boxes for wiring systems above 600V shall be identified with high voltage warning labels installed every 20 linear feet in accordance with OSHA standards. All boxes shall also be painted red, see Section 09900 of the specifications.

3. All junction and pull boxes for the fire alarm system shall be painted red. All raceway for the fire alarm system shall be labeled "Fire Alarm" in red letters on intervals not to exceed ten feet.

D. Underground Cable Identification:

1. During back-filling/top-soiling of each exterior underground electrical, signal or communication conduits, install continuous underground-type plastic line marker, located directly over buried line at 6 to 8 inches below finished grade. Where multiple small lines are buried in a common trench and do not exceed an overall width of 16 inches, install a single line marker.

2. Install line marker for every buried conduit.

E. Cable/Conductor Identification:

1. Apply cable/conductor identification, including voltage, phase and feeder number, on each cable/conductor in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project's electrical work. Refer to Section 16100 - Basic Materials and Methods of these specifications for color coding requirements.

F. Operational Identification and Warnings:

1. Wherever directed by the Owner's Representative, to ensure safe and efficient operation and maintenance of electrical systems, including prevention of misuse of electrical facilities equipment by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposed. Request a meeting with the Owner's Representative prior to substantial completion to coordinate warning requirements.

G. Danger Signs:

1. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations identified by the Owner's Representative as constituting similar dangers for persons in or about project. Request a meeting with the Owner's Representative prior to substantial completion to coordinate danger sign requirements.

   a. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110-120 volts.

   b. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

H. Equipment/System Identification:

1. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including

communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2 inch high lettering, on 1-1/2 inch high sign (2 inch high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:

a. Electrical cabinets and enclosures.

b. Access panel/doors to electrical facilities.

c. Transformers.

d. Fire alarm control panel, battery cabinets, voice alarm system cabinets, and transponders.

2. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate. Identification of flush mounted cabinets and panelboards shall be on the inside of the device.

3. Panelboards, individually mounted circuit breakers, and each breaker in the switchboards, secondary unit substations, and distribution panels shall be identified with an engraved plastic laminate sign. Plastic nameplates shall be multicolored laminated plastic with faceplate and core as scheduled. Lettering shall be engraved minimum 1/4 inch high letters.

a. 208/120 volt normal power equipment shall be identified with green faceplate with white core.

b. 208/120 volt equipment branch power equipment shall be identified with blue faceplate with white core.

c. Equipment identification is to indicate the following:

1) Equipment ID abbreviation.

2) Voltage, phase, wires and frequency.

3) Emergency or other system.

4) Power source origination.

5) Example:

(a) Panel GLSH1

(b) 208/120V, 3 phase, 4 wire

(c) Fed by GLSD1

d. Submit complete schedule with the shop drawings listing all nameplates and information contained thereon.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work required under this section of the specifications consists of the electrical acceptance testing and inspections for all electrical systems and equipment installed or affected by this project. The Contractor shall prepare and submit to the Engineer for review and approval acceptance test procedures and inspection forms in accordance with this specification. A complete functional acceptance test shall be performed on all electrical systems and equipment to prove they perform as intended under all modes of operation. Testing specified in other sections is in addition to testing specified herein. Also the testing will demonstrate the electrical system and equipment operation to the Owner. All labor, materials, rentals, permits and testing equipment or other which is required shall be provided by the Contractor.

1.02 GENERAL

A. The Contractor shall prepare and submit to the Engineer for review and approval acceptance test procedures and inspection forms in accordance with this specification. Testing shall be performed by the Contractor, the manufacturer's representative, and/or a International Electrical Testing Association (NETA) testing company depending on the type of equipment or system being tested as follows:

1. CONTRACTOR

    a. Cables, Low-Voltage, 600-Volt Maximum

    b. Switches and Circuit Breakers, Air, Low-Voltage

    c. Fiber Optic Cable

    d. Lighting System

    e. Clock System

    f. Telecommunications System

    g. Grounding System

    h. Low Voltage (600 VAC maximum) Power Distribution System

    i. Instrument and Control System

2. MANUFACTURER'S REPRESENTATIVE

    a. Fire Alarm System

3. NETA

    a. Switchgear and Switchboard Assemblies (480VAC, 1000A or greater)

    b. Ground Fault Protection System

    c. Circuit Breakers

    d. Metering Devices

B. The Contractor shall prepare the test procedures and inspection forms and perform the specified testing and inspections, for the assigned equipment and systems above, as applicable to the equipment and systems installed or affected by the project. If the Contractor (including sub contractors) does not have the ability or qualifications to conduct the required tests then the Contractor will sub contract with a testing organization who does.

C. The Contractor shall engage in and pay for the services of the Manufacturer's Representative approved testing organizations to provide testing and inspection of the applicable electrical equipment and systems as listed above and specified in this section. The testing organizations may be an independent division or authorized representative of the manufacturer of the assembled products being tested. The Manufacturer's Representative will conduct startup testing and will be part of integrated system testing. If an outside testing organization is approved, a representative of the manufacturer shall be under contract by the testing company. The representative shall be present during all testing to insure that the testing is performed properly and that any deficiencies discovered are promptly corrected. The Manufacturer's Representative will assist in the preparation and performance of other test procedures and inspections such as integrated system testing (e.g., loss of power/ generator/ats/ups/annunciator integrated system test)

D. The Contractor shall engage in and pay for the services of a NETA Accredited Testing Company to provide testing and inspection applicable electrical equipment and systems as listed above and specified in this section. Also, the NETA testing contractor will conduct integrated system testing or other testing as required. NETA testing will be conducted per the current Standard for NETA Acceptance Testing Specification including test report preparation and submittals. Technicians performing these electrical tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated. These individuals shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make a judgment on the serviceability of the specific equipment. Technicians shall be certified in accordance with the current ANSI/NETA ETT, Standard for Certification of Electrical Testing Personnel. Each on-site crew leader shall hold a current certification, Level III or higher, in electrical testing. The testing organization shall provide the following: A written record of all tests and a final report; All field technical services, tooling, equipment, instrumentation, and technical supervision to perform such tests and inspections; Specific power requirements for test equipment; Notification to the owner's representative prior to commencement of any testing; A written record of

all tests and a final report and a timely notification of any system, material, or workmanship that is found deficient based on the results of the acceptance tests. The NETA contractor will assist in the preparation and performance of other test procedures and inspections such as an acceptance testing of the integrated system (e.g., loss of power/generator/ATS/UPS/annunciator integrated system test)

E. Submit all test reports to the Owners Representative at least two weeks prior to the project final inspection for review.

1.03 SAFETY AND PRECAUTIONS

A. All parties involved must be cognizant of industry-standard safety procedures. This document does not contain any procedures including specific safety procedures. It is recognized that an overwhelming majority of the tests and inspections recommended in these specifications are potentially hazardous. Individuals performing these tests shall be qualified and capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved.

B. Safety practices shall include, but are not limited to, the following requirements:

1. All applicable provisions of the Occupational Safety and Health Act, particularly OSHA 29 CFR Part 1910 and 29 CFR Part 1926 including OSHA lockout procedures.

2. ANSI/NFPA 70E, Standard for Electrical Safety in the Workplace.

3. Applicable state and local safety operating procedures.

4. Owner's safety practices.

5. A safety lead person shall be identified prior to the commencement of work.

6. A safety briefing shall be conducted prior to the commencement of work.

7. All tests shall be performed with the apparatus de-energized and grounded except where otherwise specifically required to be ungrounded or energized for certain tests.

8. The testing organization shall have a designated safety representative on the project to supervise operations with respect to safety.

1.04 QUALITY ASSURANCE

A. The testing and inspection shall comply with all applicable sections of the following codes and standards:

1. American National Standards Institute - ANSI

2. American Society for Testing and Materials - ASTM

3. Association of Edison Illuminating Companies - AEIC

4. Institute of Electrical and Electronics Engineers - IEEE

5. Insulated Power Cable Engineers Association - IPCEA

6. International Electrical Testing Association - NETA Acceptance Testing Specifications

7. California Electrical Code - CEC

8. National Electrical Manufacturers Association - NEMA

9. National Fire Protection Association - NFPA

10. State and Local Codes and Ordinances

B. The inspection and testing shall comply with the project plans and specifications as well as with the manufacturer's drawings, instruction manuals, and other applicable data for the apparatus tested.

C. Review and Approval- All test reports, deficiencies and corrections, test results, shall be reviewed by the Engineer of Record.

1.05 DIVISION OF RESPONSIBILITY

A. Perform routine insulation-resistance, continuity, and rotation tests for all distribution and utilization equipment prior to and in addition to tests performed by the testing firm specified herein.

B. Supply a suitable and stable source of electrical power to each test site. The testing firm shall specify the specific power requirements.

C. Notify the testing firm when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.

D. Supply a complete set of electrical plans, specifications, and any pertinent change orders to the testing firm prior to commencement of testing.

E. Notify the Engineer and Owner's Representative prior to commencement of any testing.

F. Any system, material or installation which is found defective on the basis of acceptance tests shall be reported to the Owner's Representative.

G. The testing firm shall maintain a written record of all tests and, upon completion of project,

shall assemble and certify a final test report for review and approval by the Engineer of Record.

1.06 ACCEPTANCE TEST PROCEDURES

A. The Acceptance Test Procedure shall include the following sections:

1. Purpose of Test
2. References
3. Test Participants- Name/Company/Telephone Number and hand signed Initials
4. Equipment and Systems tested.
5. Description of test.
6. Acceptance Criteria
7. Initial Conditions/Prerequisites
8. Test Equipment and Calibration date
9. Test Procedure and Date of Test
10. Test Results-verification of passing acceptance criteria.
11. Deficiencies, Corrections and Re-test
12. Verification Systems and Equipment are returned to Operational Status
13. Conclusions and recommendations.
14. Appendix, including test forms.

B. Each piece of equipment shall be recorded in the test procedure listing the condition of the equipment as found and as left. Included shall be recommendations for any necessary repair or replacement parts. The test procedures shall indicate the name of the engineer who tested the equipment and the date of the test completion.

C. Inspection Reports may be in situ test reports prepared by manufacturer representatives such as startup test reports by, for example the UPS or Generator manufacturers' startup representative. The inspection reports shall indicate the name of the person who inspected the equipment and the date of completion.

D. The Acceptance Test Procedure shall be a step-by-step procedure to be followed verbatin

and initialed after each step's performance. The test shall include the listed sections above. The procedure shall be prepared on 8.5" x 11" paper. See Attachment 1 as an example.

1.07 TESTING INSTRUMENT TRACEABILITY

A. All applicable test instrumentation shall be currently calibrated within rated accuracy.

B. The accuracy shall be traceable to the National Bureau of Standards in an unbroken chain.

C. Instruments shall be calibrated in accordance with the following frequency schedule:

1. Field instruments: 6 months maximum.

2. Laboratory instruments: 12 months.

3. Leased specialty equipment: 12 months

D. Dated calibration labels shall be visible on all test equipment.

1.08 FINAL SETTINGS

A. The Contractor shall be responsible for implementing all final settings and adjustments of equipment in accordance with manufacturer's and/or Engineer's specified values. The Contractor shall be responsible to request any required setting values from the Engineer.

1.09 SUBMITTALS

A. At least two weeks prior to conducting testing, submit Acceptance Test Procedures and Inspection Reports for review and approval by the Electrical Engineer of Record. This includes the prepared test report outlined above including all systems and equipment to be tested (with the test results, deficiencies, and conclusions sections blank). The Contractor shall be responsible to integrate the testing by the Contractor, Manufacturing Representatives, and NETA testing organization. The NETA testing organization shall prepare the Testing Documents per the current NETA Acceptance Testing Specification and assist the Contractor in preparing an Integrated System Test. The Manufacturing Representative testing organization shall prepare their regular start up test plan and assist the Contractor in preparing an Integrated System Test. After review and approval the test report shall be executed.

B. At least two week prior to conduction testing, submit for review and approval by the Engineer the list of test participants and prove of their qualifications and demonstrate they have the necessary testing experience and training to conduct the test.

C. Record copies of the completed test report shall be submitted no more than 30 days after completion of the testing and inspection.

1.10 FAILURE TO MEET TEST

A. Any found defective on the basis of acceptance test shall be reported directly to the Engineer.

B. Contractor shall replace the defective material or equipment and have test repeated until test proves satisfactory without additional cost to the Owner.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EQUIPMENT TO BE TESTED AN INSPECTED

A. The following equipment shall be tested in accordance with the scopes of work which follow and additional participation in other acceptance testing such as integrated system and functional testing. Acceptance test procedures and inspection reports shall be prepared, submitted and approved prior to performance of testing and inspections. The party responsible is identified in accordance with the following key: C = Contractor/Installer; M = Manufacturer; T = Testing Agency.

1. Molded Case Circuit Breakers - C
2. Fire Alarm System - M
3. Grounding System - C
4. Cables, Low Voltage, 600 Volts Maximum - C
5. Ground Fault Systems - C
6. Low Voltage Switchgear and Switchboards - T
7. Low Voltage Power Circuit Breakers and Insulated Case Circuit Breakers - T
8. Lighting Control System - C
9. Telecommunications Systems-C or M
10. Other Systems-C, M, T

3.02 INSPECTIONS

A. DRY TYPE TRANSFORMERS

1. Visual and Mechanical Inspection:

a. With case covers removed, inspect transformer core and coil assembly and enclosure interior. Cloth wipe and brush major insulating surfaces.

b. Check primary, secondary, and ground connections.

c. Check tap connections and tap changer.

d. Inspect all bolted connections. Torque wrench tighten or remake any questionable connections.

e. Inspect insulators, spacers, and windings.

f. Inspect for adequate electrical clearance.

g. Check base or support insulators, including vibration isolation supports.

h. Check accessory devices for condition and proper operation.

i. Verify that the transformers have been provided with adequate spacing for ventilation.

B. MOLDED CASE CIRCUIT BREAKERS

1. Visual and Mechanical Inspection:

a. Inspect cover and case, and check for broken or loose terminals.

b. Operate breaker to check operation.

c. Verify proper reporting of the events on the project equipment monitoring system

2. Electrical Tests (400 ampere frame and larger):

a. Insulation Resistance Test: Megger main poles of breaker pole-to-pole, from each pole to ground, and across the open contacts of each pole.

b. Contact Resistance Test: Ductor across main pole contacts with breaker closed and latched to check for good, low resistance contact.

c. Test overcurrent trip device and calibrate. Where primary injection testing is specified, test each pole of the breaker individually. Data shall be compared with manufacturer's published data.

1) All trip units shall be tested by primary injection.

2) Static overcurrent trip devices shall be tested per manufacturer's instructions.

3) Test for minimum pick-up current.

4) Apply 300% of pick-up current and measure time necessary to trip breaker (long time delay).

5) Where short time delay characteristics are provided, test short time pick-up and delay.

6) Test instantaneous trip by passing current sufficiently high to trip breaker instantaneously.

7) Where ground fault protection is provided, test ground fault pick-up and delay.

8) Check reset characteristics of trip unit.

9) Electrically test any auxiliary devices such as shunt trips, undervoltage trips, alarm switches, and auxiliary switches.

C. FIRE ALARM SYSTEM

1. Visual and Mechanical Inspection:

a. Inspect each device for physical damage.

b. Check for proper labeling of conductors.

c. Inspect all test switches for proper operation.

d. Inspect all system lamps and LED's for proper operation. Replace all non-operational equipment.

e. Check all cabinet doors latches and hinges for proper operation. Adjust, lubricate, and repair as required.

f. Verify proper reporting of the events on the project equipment monitoring system.

2. Electrical Tests: Test each individual circuit at panel with equipment connected for proper operation. Entire system shall test free from opens, grounds, and short circuits. Verify control circuit integrity: Field tests to verify component compliance with specifications, adjusting, calibrating, and setting circuit breaker, relays, timers, etc. Testing will include, but not be limited to the following:

a. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

b. Close each sprinkler system control valve and verify proper supervisory alarm at the FACP.

c. Verify activation of all flow switches.

d. Open initiating device circuits and verify that the trouble signal actuates.

e. Open and short signaling line circuits and verify that the trouble signal actuates.

f. Open and short indicating appliance circuits and verify that trouble signal actuates.

g. Ground all circuits and verify response of trouble signals.

h. Check presence and audibility of all alarm notification devices.

i. Check installation, supervision, and operation of all intelligent smoke detectors.

j. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

k. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

l. Check the integrity of the software program with the system in complete operation. Verify that each message reported is correct with respect to the signal received. All possible operating conditions and system troubles shall be tested. Rewrite software as required.

m. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

n. Close each sprinkler system control valve and verify proper supervisory alarm at the FACP.

o. Verify activation of all flow switches.

p. Open initiating device circuits and verify that the trouble signal actuates.

q. Open and short signaling line circuits and verify that the trouble signal actuates.

r. Open and short indicating appliance circuits and verify that trouble signal actuates.

s. Ground all circuits and verify response of trouble signals.

t. Check presence and audibility of all alarm notification devices.

u. Check installation, supervision, and operation of all intelligent smoke detectors.

v. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

w. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

x. Check the integrity of the software program with the system in complete operation. Verify that each message reported is correct with respect to the signal received. All possible operating conditions and system troubles shall be tested. Rewrite software as required.

D. GROUNDING SYSTEM

1. Visual and Mechanical Inspection:

a. Inspect wiring system outlet and junction boxes for proper grounding. Green grounding conductor shall be connected to outlet and junction boxes. Inspect a minimum of 5% of project boxes.

b. Verify connections of grounds for the secondary of separately derived grounding systems, i.e. at dry type transformers. Note type of connection, i.e. mechanical or exothermic.

c. Verify proper connection to all components of building service entrance grounding system. Note all system components which are interconnected and type of connection either mechanical or exothermic. Note depth of driven ground rods.

2. Electrical Tests (Small Systems):

a. Perform ground-impedance measurements utilizing the fall-of-potential method per ANSI/IEEE Standard 81 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System". Instrumentation utilized shall be specifically designed for ground impedance testing. Provide

sufficient spacing so that plotted curves flatten in the 62% area of the distance between the item under test and the current electrode.

b. Equipment Grounds:

1) Utilize two-point method of IEEE Std. 81. Measure between equipment ground being tested and known low-impedance grounding electrode or system.

3. Electrical Tests (Large Systems):

a. When sufficient spacing of electrodes described above is impractical, perform ground-impedance measurements utilizing either the intersecting curves method or the slope method. (Ref. Nos. 40 and 41 in IEEE Std. 81.)

b. Test Values:

1) The main ground electrode system impedance-to-ground should be no greater than five (5) ohms. Equipment grounds, depending on size and length of grounding conductor, should be only fractionally higher than system ground.

E. CABLES - LOW-VOLTAGE - 600V MAXIMUM

1. Visual and Mechanical Inspection:

a. Inspect cables for physical damage and proper connection in accordance with single-line diagram.

b. Test cable mechanical connections to manufacturer's recommended values using a calibrated torque wrench.

c. Check cable color-coding with applicable specifications and National Electrical Code standards.

2. Electrical Tests:

a. Perform insulation-resistance test on each feeder on the riser diagram with respect to ground and adjacent conductors. Applied potential shall be 1000 volts dc for 1 minute.

b. Perform continuity test to insure proper cable connection.

c. Test Values:

1) Evaluate results by comparison with cables of same length and type. Investigate any values less than 50 megohms.

2) Provide a test report for each feeder which indicates the manufacturer's target values and actual test reading. Report shall indicated pass/fail for each feeder. Submit report to Owner's Representative for approval. Include test report in project maintenance manual.

d. Feeder Cables:

1) 600-volt feeder cables in the building and secondary service cables to the building shall be tested using a megohmmeter, to measure the insulation resistance of each conductor in the circuit.

2) Disconnect all equipment switches, relays, buswork, transformers, etc.) from the cable being tested.

3) Tests to be performed in a dry area.

4) Clean and dry cable ends with a cloth moistened with a suitable solvent.

e. Cable Values: Cable values shall be established and provided by the cable manufacturer. Provide target value insulation resistance (IR) in megohms, based on 1000 ft. at 60 Deg F.

f. Temperature Correction Factor: For temperatures above or below 60ºF, a correction factor may have to be applied to determine the true IR value. However, if the measured IR of the system is equal to or greater than the calculated value, a correction factor is not needed.

g. Correct insulation deficiencies which show and insulation resistance of less than one megohm.

h. Test conductors with power off and impress a voltage of not less than 500 volts D.C.

i. Perform continuity tests on all conductors.

F. GROUND-FAULT SYSTEMS (CEC 230-95)

1. Visual and Mechanical Inspection:

a. Inspect for physical damage and compliance with drawings and specifications.

b. Inspect neutral main bonding connection to assure:

1) Zero-sequence sensing system is grounded.

2) Ground-strap sensing systems are grounded through sensing device.

3) Ground connection is made ahead of neutral disconnect link on zero-sequence sensing systems.

4) Grounded conductor (neutral) is solidly grounded.

c. c.Inspect control power transformer to ensure adequate capacity for system.

d. Manually operate monitor panels (if present) for:

1) Trip test.

2) No trip test.

3) Nonautomatic reset.

e. Record proper operation and test sequence.

f. Set pickup and time-delay settings in accordance with the settings provided by the University's Representative.

g. Verify proper reporting of the events on the project equipment monitoring system.

2. Electrical Tests:

a. Measure system neutral insulation to ensure no shunt ground paths exist. Remove neutral-ground disconnect link. Measure neutral insulation resistance and replace link.

b. Determine the relay pickup current by current injection at the sensor and operate the circuit interrupting device.

c. Test the relay timing by injecting three hundred percent (300%) of pickup current, or as specified by manufacturer.

d. Test the system operation at fifty-seven percent (57%) rated control voltage, if applicable.

e. Test zone interlock systems by simultaneous sensor current injection and monitoring zone blocking function.

f. On multiple source, tie breaker, etc., systems, devise a simulation scheme that fully proves correct operation.

g. Test Parameters:

1) System neutral insulation shall be a minimum of one hundred (100) ohms, preferably one (1) megohm or greater.

2) Relay timing shall be in accordance with manufacturer's published time-current characteristic curves but in no case longer than one (1) second for fault currents equal to or greater than 3,000 amperes.

3) Relay pickup value shall be within +10% of setting and in no case greater than 1200A.

G. LOW VOLTAGE SWITCHBOARDS

1. Visual and Mechanical Inspection:

a. Verify that the enclosure interiors have been cleaned of accumulated dust, dirt, oil films, and other foreign materials.

b. Inspect all electrical and mechanical components for condition and any evidence of defects or failure.

c. Check for proper travel and alignment of any drawout or plug-in circuit breakers.

d. Check breaker connections to bus.

e. Inspect bolted connections. Torque wrench tighten or remake any questionable connections.

f. Inspect for missing or loose hardware or accessories.

g. Inspect ground bus connections.

h. Operate key and door interlock devices to assure proper operation.

i. Verify proper reporting of the events on the project equipment monitoring system.

2. Electrical Tests:

a. Insulation Resistance Test: Megger main secondary bus and feeder circuits phase-to-phase and phase-to-ground.

b. Energize any space heater circuits to insure proper operations.

c. Check phase rotation with a Biddle phase rotation meter.

d. Instruments and Meter Tests:

1) Inspect panel mounted instruments and meters. Clean and check for calibration accuracy. Make minor adjustments as necessary.

H. LOW VOLTAGE POWER CIRCUIT BREAKERS AND INSULATED CASE CIRCUIT BREAKERS

1. Visual and Mechanical Inspection:

a. Remove each draw-out type circuit breaker.

b. Inspect arc chutes of power circuit breakers.

c. Inspect circuit breaker for defects or damage.

d. Inspect and check contacts. Check alignment, over-travel, and pressure. Adjust if necessary.

e. Inspect finger clusters on line and load stabs of draw-out circuit breakers.

f. Check for proper mechanical operation. Lubricate where necessary.

g. Check auxiliary devices for proper operation.

h. Check breaker racking device (if applicable) for alignment and friction-free operation. Lubricate if necessary.

i. Verify proper reporting of the events on the project equipment monitoring system.

2. Electrical Tests:

a. Insulation Resistance Test: Megger main poles of breaker pole-to-pole, from each pole to ground, and across the open contacts of each pole.

b. Contact Resistance Test: Ductor across main pole contacts with breaker closed and latched to check for good, low resistance contact.

c. Test overcurrent trip device by primary injection and calibrate to settings provided. Static overcurrent trip devices shall be tested per the manufacturer's instructions. Test each pole of the breaker individually. Data shall be compared with manufacturer's published data.

1) Test for minimum pick-up current.

2) Apply 300% of pick-up current and measure time necessary to trip breaker (long time delay).

3) Where short time delay characteristics are provided, test short time pick-up and delay.

4) Test instantaneous trip by passing current sufficiently high to trip breaker instantaneously.

5) Where ground fault protection is provided, test ground fault pick-up and delay.

6) Check reset characteristic of trip unit.

d. Electrically test any auxiliary devices such as shunt trips, undervoltage trips, alarm contacts, and auxiliary contacts.

I. LIGHTING CONTROL SYSTEM

1. Visual and Mechanical Inspection:

a. Inspect each device for physical damage.

b. Check for proper labeling of conductors.

c. Inspect all system lamps and LED's for proper operation. Replace all non-operational equipment.

d. Check all cabinet doors, latches, and hinges for proper operation. Adjust, lubricate, and repair as required.

2. Electrical Tests:

a. Verify the absence of unwanted voltages between circuit conductors and ground that would constitute a hazard or prevent proper system operation.

b. Meggar test all conductors (other than those intentionally grounded) for isolation from ground.

c. Test all conductors (other than those intentionally connected together) for conductor-to-conductor isolation using as insulation testing device.

d. The control unit shall be tested to verify it is in the proper operating condition as detailed in the manufacturer's manual.

e. Each control circuit shall be tested to confirm proper operation of the circuit. Monitor the system with all building equipment energized, such as variable speed controllers, to verify the absence of control inhibiting electrical noise.

END OF SECTION

LOW-VOLTAGE TRANSFORMERS

Section 26 22 00
21-32-051

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 2014.

B. NEMA ST 20 - Dry-Type Transformers for General Applications; National Electrical Manufacturers Association; 2014.

1.02 REQUIREMENTS INCLUDED

A. The General Conditions, Supplementary General Conditions, Special Conditions and Division 1 General Requirements apply to the work of this section.

B. This section describes requirements for dry type transformer.

C. This section describes requirements for dry type transformer K-rated.

1.03 RELATED WORK

A. Section 26 0100: General Requirements for Electrical Work.

1.04 REFERENCE STANDARDS

A. The Underwriters Laboratory, Inc. (UL).

B. National Electrical Manufacturers Association (NEMA).

1.05 QUALIFICATIONS

A. The equipment manufacturer shall be ISO 9000, 9001 or 9002 certified.

B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

C. The transformers shall be suitable for and certified to meet all applicable seismic requirements of the International Building Code (IBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the transformer manufacturer and be based upon testing of representative equipment.

D. The test response spectrum shall be based upon a 5 percent minimum damping factor, IBC: a peak of 0.75g, and a ZPA (zero period acceleration) of 0.38g. The tests shall fully envelope this response spectrum for all equipment natural frequencies up to at least 35Hz.

1.06 SUBMITTALS

A. Submit manufacturers' data and shop drawings in accordance with Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements for items listed.

B. Manufacturers Data:

1. Dimension drawing and weight.

2. Technical certification sheet.

3. Conduit entry/exit locations.

4. Transformer ratings including:

a. Primary and secondary kVA.

b. Voltage.

c. Taps.

d. Primary and secondary continuous current.

e. Basic Impulse level for equipment over 600-volts.

f. Impedance.

g. Insulation class and temperature rise.

h. Sound level.

PART 2 - PRODUCTS

2.01 ALL TRANSFORMERS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:

1. Altitude: Less than 3,300 feet (1,000 m).

2. Ambient Temperature: Not exceeding 86 degrees F (30 degrees C) average or 104 degrees F (40 degrees C) maximum measured during any 24 hour period.

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.02 DRY TYPE POWER TRANSFORMERS

A. General: Provide dry type power transformers, for lighting and general power applications, rated as indicated.

B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, yearly operation, with normal life expectancy as defined in American National Standards Institute (ANSI) C57.96.

C. Shipping: Provide lifting holes, accessible without removal of any of the enclosure components.

D. Insulation, as listed:

Insulation Size	Temperature Class	Rating	Hot Spot Allowance
2kVA & below degrees C	NEMA B or better	80 degrees C rise	30
3kVA thru 15 kVA degrees C	NEMA F or better	115 degrees C rise	30
15kVA and above degrees C	NEMA H	150 degrees C rise	30

E. Base temperature rating and hot spot allowances in the above table on a 40 degrees C maximum ambient temperature and 30 degrees C average ambient temperature.

F. Overload Capacity: 10 percent above full load rating continuously in an ambient not exceeding 40 degrees C.

G. Case Temperature: Maintain no more than a 35 degrees C rise above a 40 degrees

C ambient.

H. Taps, as listed:

Transformer Rating	Phase	Taps
Through 10kVA	Single	None
15kVA thru 2kVA	Single	(2) 5 percent FCBN
6kVA thru 15kVA	Three	(2) 5 percent FCBN
30kVA and larger	Single and Three	(2) 2-1/2 percent FCAN and (4) 2-1/2 percent FCBN

where FCBN - Full Capacity Below Normal.

I. Sound levels, not to exceed listed values, as determined by NEMA standards:

Size	Sound Level in dB
Through 9kVA	40
10 through 50kVA	45
51 through 150kVA	50

J. Provide vibration isolating mounts to isolate the enclosure from the core and coil assembly.

K. Mounting, suitable as listed:

1. Single Phase Transformers: Wall

2. Three Phase Transformers, through15kVA: Wall.

3. Three Phase Transformers, 15kVA and above: Floor or ceiling hung channel.

L. Provide conduit knockouts for line and load conduit entrance.

M. Enclosure:

1. Units rated 30kVA and below, the encapsulated enclosure construction shall be totally enclosed, non-ventilated, NEMA 3R, with lifting eyes.

2. Units rated 15kVA and above, the enclosure construction shall be ventilated, NEMA 2, drip-proof, with lifting holes. All ventilation openings shall be protected against falling dirt.

3. Outdoor units rated 15kVA or above, provide suitable weather-shields over ventilation openings.

N. Finish: Degrease, clean, phosphatize, prime and finish all interior and exterior

surfaces with baked enamel, color ANSI 61 or standard factory grey.

O. Connect a grounding strap from the secondary neutral to a grounding lug on the enclosure.

P. Terminals: As specified in Section 16100 - Basic Materials and Methods.

Q. Subject transformers 25kVA above to listed production test at factory:

1. Ratio tests at the rated voltage connection and at all tap connections.
2. Polarity and phase relation tests on the rated voltage connection.
3. Applied ptotential tests.
4. Induced potential test.
5. No-load and excitation current at rated voltage on the rated voltage connection.

R. Factory to perform the listed standard tests on unit of identical design:

1. No-load losses.
2. Total losses.
3. Sound levels.
4. Temperature rise.
5. Impulse.
6. Impedance.
7. Induced potential.
8. Applied potential.

S. Submit certified test reports for production and standard tests.

T. Manufacture: Cutler-Hammer, General Electric, Sorgel.

2.03 DRY TYPE POWER TRANSFORMERS (K-FACTOR RATED)

A. General: Provide dry type power transformers, for lighting and general power applications, rated as indicated.

B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, yearly operation, with normal life expectancy as defined in American National Standards Institute (ANSI) C57.96.

C. The transformers shall be specifically designed to supply circuits with a harmonic

profile equal to or less than a K-factor of 4 to 13 without exceeding 115 degree C temperature rise.

D. Shipping: Provide lifting holes, accessible without removal of any of the enclosure components.

E. Insulation, as listed:

Insulation Size	Temperature Class	Rating	Hot Spot Allowance
2kVA & below	NEMA B or better	80 degrees C rise	30 degrees C
3kVA thru 15kVA	NEMA F or better	115 degrees C rise	30 degrees C
15kVA & above	NEMA H	150 degrees C rise	30 degrees C

F. Base temperature rating and hot spot allowances in the above table on a 40 degrees C maximum ambient temperature and 30 degrees C average ambient temperature.

G. Case Temperature: Maintain no more than a 35 degrees C rise above a 40 degrees C ambient.

1. Taps, as listed:

Transformer Rating	Phase	Taps
Through 10kVA	Single	None
15kVA thru 25kVA	Single	(2) 5 percent FCBN
6kVA 15kVA	Three	(2) 5 percent FCBN
30kVA and larger	Single and Three	(2) 2-1/2 percent FCAN and (4) 2-1/2 percent FCBN

H. Sound levels, not to exceed listed values, as determined by NEMA standards:

Size	Sound Level in dB
Through 9kVA	40
10 through 50kVA	45
51 through 150kVA	50

I. Non-linear ratings, to supply circuits with a harmonic profile equal or less than a K-factor of 13 as listed below without exceeding 115 degree C temperature rise:

Harmonic	K-13
Fund.	100%
3rd	70%
5th	42%
7th	5%
9th	3%
11th	3%
13th	1%
15th	.7%
17th	.6%

J. Provide vibration isolating mounts to isolate the enclosure from the core and coil assembly.

K. Mounting, suitable as listed:

1. Three Phase Transformers, 15kVA and above: Floor or ceiling hung channel.

L. Provide conduit knockouts for line and load conduit entrance.

M. Finish: Degrease, clean, phosphatize, prime and finish all interior and exterior surfaces with baked enamel, color ANSI 61 or standard factory grey.

N. Connect a grounding strap from the secondary neutral to a grounding lug on the enclosure.

O. Terminals: As specified in Section 16100 - Basic Materials and Methods.

P. Subject transformers 25kVA above to listed production test at factory:

Q. Applied potential: 4kV.

1. Induced potential: 2 times normal to 7200Hz.

2. Ratio tests at the rated voltage connection and at all tap connections.

3. Polarity and phase relation tests on the rated voltage connection.

4. No-load and excitation current at rated voltage on the rated voltage connection.

R. Perform the listed standard tests on unit of identical design:

1. No-load losses.

2. Total losses.

3. Sound levels.

4. Temperature rise.

S. Impulse:

1. Impedance.

2. Induced potential.

3. Applied potential.

T. Submit certified test reports for production and standard tests.

U. Manufacture: Cutler-Hammer, General Electric, Sorgel.

PART 3 - EXECUTION

3.01 DRY TYPE POWER TRANSFORMER

A. Mount transformer on floor or wall as indicated.

B. Provide one (1) vibration isolating mount, minimum 1 inch thick with 1 inch static deflection, for each mounting point on the transformer.

C. Connect transformer with flexible metal conduit. Provide an insulated grounding bushing on conduit and bond to transformer case.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

B. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

C. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

D. UL 67 - Panelboards; Current Edition, Including All Revisions.

1.02 SUMMARY

A. This section describes requirements for branch circuit panelboards.

1.03 RELATED WORK

A. Section 26 01 00: General Requirements for Electrical Work.

1.04 REFERENCE STANDARDS

A. The Underwriters Laboratory, Inc. (UL).

B. National Electrical Manufacturers Association (NEMA).

1.05 SUBMITTALS

A. Submit manufacturers' data and shop drawings in accordance with Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements for items listed.

B. Manufacturers Data:

1. Panelboards.

C. Shop Drawings.

1. Panelboards.

PART 2 PRODUCTS

2.01 ALL PANELBOARDS

A. Provide products listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose indicated.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet (2,000 m).

2. Ambient Temperature:

C. Short Circuit Current Rating:

1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

2. Boxes: Galvanized steel unless otherwise indicated.

a. Provide wiring gutters sized to accommodate the conductors to be installed.

3. Fronts:

4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.02 BRANCH CIRCUIT PANELBOARDS

A. General: Provide bussed, circuit breaker or fusible switch type panelboards with main lugs or circuit breaker in flush or surface mounted enclosures as indicated.

B. Construction:

1. Cabinets: Code gauge steel cabinets, deadfront panels, and doors. Fasten deadfront panels to cabinets with concealed trim fasteners. Conceal front door hinges.

2. Dimensions: 20 inches wide by 6 inches deep.

3. Locks: Flush door locks, keyed alike for all panelboards.

4. Access: Door-in-Door (Not EZ-Trim).

5. Standards: Provide UL label where applicable and conform to No. 67 and 50 Underwriters Laboratories, Inc., and NEMA PB-1.

C. Bussing:

1. Phase Bus: Silver-plated copper, rated 1000 amperes per square inch cross sectional area maximum, braced for 100,000 rms amperes minimum.

2. Neutral Bus: Copper with lugs for connection of neutral conductors.

3. Ground Bus: Copper with terminals for equipment grounding conductors.

4. Terminals: As specified in Section 26 0519 - Building Wire and Cable.

D. Finish: Degrease, clean, phosphatize, prime, and finish cabinets, deadfront panels, and doors with baked enamel, color ASA-61, or standard factory grey. Galvanized cabinets are acceptable for flush cabinets.

E. Nameplates:

1. Provide a nameplate identifying panelboard in accordance with 26 0100 - General Requirements for Electrical Work.

2. Provide a manufacturer's nameplate on the deadfront interior panel indicating panelboard type, voltage rating, current rating and manufacturer's name.

F. Directory: Provide a directory card which fits into slots in the back of the panelboard. Protect directory with non-yellowing clear plastic.

G. Manufacturer: Westinghouse (Pow-R-Line 2), General Electric, Square D.

H. Circuit Breakers:

1. Provide circuit breakers for miscellaneous branch circuits with frame sizes and ratings as shown on the plans.

2. Bolt-on, thermal magnetic, molded case, with inverse time current overload, and instantaneous magnetic trips, trip-free and trip-indicating all poles of multi-pole device shall operate simultaneously during open, close and trip operations. Provide circuit breakers indicated with the following ratings:

Panel Type	Circuit Breaker Frame Size	Trip Rating (Amperes)	Voltage (AC Rating	Symmetrical AC Interrupting Capacity
1	100/1 pole	15-100	120	10,000 Min.
	100/2 & 3 poles	15-100	240	10,000 Min.
	150/2 & 3 poles	110-150	240	18,000 Min.
	225/3 poles	125-225	240	22,000 Min.

I. Manufacturer: Eaton Cutler-Hammer (Pow-R-Line 2), General Electric, Square D.

PART 3 - EXECUTION

3.01 BRANCH CIRCUIT PANELBOARDS

A. Mount panelboard so that the top is 6 feet-6 inches above the finished floor.

B. Neatly terminate conductors onto breaker, ground bus and neutral bus. Train conductors in an organized grouping with conductors fanning out at the circuit terminals, bundled in the wireways and laced with plastic ties.

C. Identify all conductors with a circuit number and phase color.

D. Type all panelboard directories.

E. Provide a minimum of three (3) 3/4 inch empty conduits into accessible ceiling space.

F. Provide insulated grounding bushings on all conduits which enter the cabinet and bond to ground bus.

G. Install conduits in a vertical line, perpendicular to the cabinet.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide electrical materials, installation and testing for the interior improvements in Serna School kitchen.

1.02 DESCRIPTION

A. This section describes requirements for wiring devices and connections.

1.03 RELATED WORK

A. Section 26 01 00: General Requirements for Electrical Work.

B. Section 26 05 26: Grounding and Bonding for Electrical Systems.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2000.

B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).

C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002.

D. CEC - California Electrical Code; most recent edition.

1.05 SUBMITTALS

A. Submit manufacturers' data and shop drawings in accordance with Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements for items listed.

B. Provide submittals for items listed documenting compliance with specification requirements.

C. Product Data:

1. Electrical Materials: Manufacturer's current published catalog sheets.

PART 2 - PRODUCTS

2.01 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.02 WIRING DEVICES

A. Provide UL listed wiring devices, ivory or color selected by Engineer, with voltage and current ratings specified and wire terminations designed to contain stranded conductors. Provide

grounding type receptacles. Provide RED color for all wiring devices connected to the emergency power system.

B. Provide 120 volt single and duplex receptacles which meet Federal Specification W-C-596 as listed:

1. SPECIFICATION GRADE - COMMERCIAL (DESIGNER)

	HUBBELL	PASS & SEYMOUR	LEVITON
NEMA 5-20R single	#2161	#26342	#16351
NEMA 5-20R duplex	#2162	#26342	#16352

C. Provide receptacles other than 120 volt single and duplex as indicated on drawings.

D. Provide 20 amp AC quiet type switches which meet federal specification W-C596 with voltage ratings to suit branch circuit requirements indicated and as listed:

	HUBBELL	PASS & SEYMOUR	LEVITON
Single Pole	1221	20AC	1221
Double Pole	1222	5952	1222
Three Way	1223	20AC3	1223
Four Way	1224	5954	1224
SPST	1557	5935	1257

Momentary

E. Listed manufacturers establish a standard of quality. Substitutions will be considered in accordance with Section 26 01 00, General Requirements for Electrical Work.

F. Key Switches: Equivalent to listed switches, activated with removable key.

G. Switch with Pilot Light: Leviton #5226, Bryant #6405, G.E. #7945, or equal.

H. Wall Plates: Type 302 stainless steel, satin finish, minimum 0.040 inch thick, single or multiple gang.

PART 3 - EXECUTION

3.01 WIRING DEVICES

A. Connect wiring devices to circuits indicated using side or back wiring terminals, designed to contain stranded wire.

B. Connect green grounding pigtail from receptacles to outlet box with screw.

C. Install wiring devices flush with the device plate fronts.

D. Align plates plumb with wall, and cover opening, without use of "jumbo" plates.

END OF SECTION

PART 1 – GENERAL

1.01 Introduction

The following specifications are intended to assist in the development of a telecommunications system for accommodating present and future technologies within the Lodi Unified School District. They provide a set of instructions and materials needed to install a telecommunications system within parameters set by industry standards. The requirements for the structured cabling systems within the facilities are continued in this document.

1.02 Work Included

- Contractor shall design and provide all materials in order to install a complete and functional data/telecommunications and cable television infrastructure.
- Only ONE Contractor shall be responsible for providing a complete and functional infrastructure, including necessary components and documentation.
- Documentation will include MS Visio drawings showing room drop locations, cable runs, and conduit pathways. Data, voice, and coax cables are all part of the same infrastructure and shall all be installed, terminated, labeled, and documented by only one contractor (no exceptions).

1.03 Contractor Qualifications

- Must be a Panduit Certified Installer and have an Anixter account in good standing.
- Must possess a valid C-7 California State contractor's license. This license must have been issued 2 years prior to the date of the bid. No other license classification is acceptable.
- Must be able to prove to the satisfaction of LUSD that they have significant experience in the installation of fiber optic systems.
    - Proper installation of fiber optic cable
    - Fiber termination
    - Interconnecting equipment
    - Test procedures with appropriate documentation.
- Must prove employees have been trained in the proper handling and cleanup of small quantities of lead paint. Contractor must contact Technology Services, prior to any work starting for an updated list of sites that require drilling work to be handled by a dedicated asbestos vendor. In the event Contractor encounters asbestos, stop work and notify district.
- Must be in trade of installing telecommunication systems, continuously, for a period of at least 3 years prior to the date of this bid.
- Must submit at least one project reference for each of the three years prior to the date of this bid.
- Must provide a minimum of 3 references supporting a claim of experience for a similar project within 2 years prior to this bid. These project references shall contain the starting and ending contract price, the project foreman or superintendent's name, and the name, address, and telephone number of a project contact.
- Must also provide a list of key installation personnel, their hire dates and a resume of their experience. Key installation personnel shall include at least one foreman and two journey level installers or technicians. By submitting the names of these personnel, contractor is committing

them to the execution of the project outlined in this specification.

1.04 Requirements

Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 Specifications Sections shall apply to work specified, in this Section.

Rules and Regulations

All work and materials shall be in full accordance with the latest rules and regulations of the following:

- EIA/TIA Standards
- BICSI Standards
- NEC Standards
- Title 24 (California Code of Regulation)
- All Local Codes
- LUSD Standards
- NFPA Standards
- ADA Requirements
- Safety, Health and Environmental Standards

Permits, Fees, and Inspections

Contractor shall be responsible for all fees and permits required to any governmental agency having jurisdiction over the work of this section. Contractor shall arrange inspections required by any local ordinances during construction. Upon completion of the work, satisfactory evidence shall be furnished to LUSD to show that all work has been installed in accordance with the code(s).

Examination of Site

Contractor shall be held to have visited the site and been satisfied with the conditions under which the work is to be performed. Contractor shall check existing conditions that may affect the work. If the contractor retains services of other firms, those firms shall investigate existing systems and determine labor and other materials required to add devices or modify systems. No allowance shall subsequently be made on the contractor’s behalf, for any extra expense resulting from a failure or neglect to discover conditions affecting the work.

Cleaning and Cleanup

All work areas shall be cleaned to remove all dust, dirt, grease, paint, or other marks. All electrical equipment shall be left in a clean condition inside and out, satisfactory to LUSD. Buildings and premises will be kept free from accumulated waste materials, rubbish and debris resulting from work. Upon completion of work: tools, appliances, surplus and waste materials, rubbish and/or debris will be removed and/or legally disposed of offsite.

Interruption of Services

- The underground route may run through areas of existing underground irrigation, signal, power, gas, water and sewer.
- Contractor must take precautions to avoid damaging/killing the root systems of existing trees. Contractor shall hand-dig as necessary to prevent disruption to existing systems, and make all repairs as required if damage occurred, at no additional cost to LUSD.

- LUSD will make every effort to assist contractor in locating existing underground routes. However, contractor will be required to pothole and inspect as needed. Contractor is responsible for USA surveys (Underground Service Alert).
- Power and signal services to existing buildings and related circuits are to remain in operation and shall not be interrupted, except by specific written approval from LUSD.
- If it is deemed necessary to shutdown circuits for the installation of new work, such shutdowns shall be scheduled with LUSD who may at its choosing, have a representative present during shutdown. Shutdowns shall be scheduled "after hours" or on weekends when an interruption would not cause a disturbance to school activities. Any accidental interruption of service to circuits or equipment as a result of work performed by the contractor shall be restored immediately in a manner acceptable to LUSD, at the contractor's expense.

Cooperation and Coordination

Contractor shall be solely responsible for instituting and maintaining safe working conditions for the project area under construction. Noise, dust, and other nuisance control measures will be implemented as effectively as possible. Work will be executed at a time when the space required by this installation is accessible. Adequate barrier and trench covers will be provided, and no equipment will be left unattended, ensuring the safety of students and staff.

Inspection

Contractor shall cooperate with the LUSD Designer/Inspector and provide assistance at all times for inspection of the work performed under this contract. Work that will be contained behind or under access covers, ground covering, or similar impediments shall be left exposed until inspected by LUSD. Contractor shall remove covers, operate devices, or perform any reasonable work that, in the opinion of LUSD, will be necessary to determine the quality and adequacy of the work.

Manufacturers Direction

Contractor shall follow manufacturer's directions that cover points not included in the drawings or specifications.

Workmanship

Contractor shall take all precautions necessary to protect existing structures. Structures or items to remain that are damaged during the course of work, shall be repaired or replaced by the contractor. Good workmanship shall be evident by the proper installation of all materials and equipment. Equipment shall be level, plumb and true with the structure and other equipment. All materials shall be firmly secured in place, adequately supported and permanent.

Contractor's Supervision

Contractor shall personally, or through an authorized and competent representative, constantly supervise the work from its commencement to its completion and acceptance. Contractor shall have the same foreman and workers on the job from its commencement to it completion, as much as possible. LUSD shall be notified of any personnel changes and supplied with the proper documents for any new personnel (I.e. lead certificates). All non-LUSD personnel shall be identified either by an ID tag or uniform with a company logo when on school grounds.

Scheduling of Work

Due to its nature, this work will have to proceed with a definite sequence of operations to minimize outages and continue facilities to all areas. The site will remain in operation during the work, and the contractor shall make every effort to maintain required services.

Guarantees

- Acceptance of the contract for this work includes this guarantee: Contractor guarantees that he has performed the work in accordance with the contract documents. Contractor also agrees to replace or repair, as new, any defective work, materials, or parts which appears within 4 years of final payment. LUSD will make the final determination of whether any defects are the responsibility of the contractor to replace or repair.
- Warranties, guarantees and certificates shall be provided for equipment and materials furnished and installed, as of the date of final payment and be delivered to LUSD. A set of “As Built” Visio drawings and test results for all installed cabling shall be provided to LUSD, before the project will be considered complete.
- Panduit Pan-Net Performance Guarantee - Contractor shall provide a 25 year application performance warranty for all Panduit Pan-Net copper cable and connectivity products. The system must be installed to meet all TIA/EIA commercial building wiring standards and installed per appropriate Panduit instruction sheets. If any Panduit product fails to perform as stated above, Panduit will provide new components at no charge.

1.05 Submittals and Substitutions

LUSD has evaluated and approved all the approved items listed in the LUSD Parts List. Substitutions to this list are possible but must be approved before a bid is accepted. Substitutions must be submitted to LUSD 10 working days before a bid is due and will either be approved or rejected 5 working days before a bid is due. The substitution documentation shall include the comparative specification listing for the approved product and the proposed product, including a complete listing of the characteristics of the equipment in the specification.

Within 10 working days after the date of the award of the contract, contractor shall submit to 3 copies of a complete submission to LUSD for review. The submission shall consist of 5 major sections, with each section separated with index tabs:

1. Section 1 shall be the Index, which will include the project title, address, name of the firm submitting the proposal and name of the architect. Each page in the submission shall be numbered chronologically and summarized in the index.
2. Section 2 shall include a copy of the contractor’s valid C-7 California State Contractor's License, documentation outlined in Section 1.02 and a list of instrumentation to be used for system testing.
3. Section 3 shall contain the pre-approved substitution submittal and the written approval from LUSD. If no substitutions are planned, it will be noted in this section as well.
4. Section 4 shall contain samples of proposed cable markers and labeling.
5. Section 5 shall contain a complete and detailed satellite cable count, workstation count, bill-of-materials and Visio drawing showing proposed work (“As Planned”). Any contractor failing to include all of the required information shall be deemed non- responsive and may be disqualified, at the discretion of LUSD.

PART 2 – PRODUCTS AND PROCEDURES

2.01 Approved LUSD Parts List

An approved parts list is detailed in “Enclosure C” of this document. Preferred education pricing provided for this list is available through Anixter Inc. (1-800-ANIXTER, reference Lodi Unified).

All products must be selected from the “LUSD Parts List,” unless substitutions have been

approved by LUSD.

2.02 Labeling

- Shall follow the “LUSD Labeling Format” specified in Enclosure B, with the exception of workstation cables (i.e. patch cords).
- Shall never be hand-written.
- Shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or type written onto adhesive labels.
- Shall have font that is at least 1/8” in height, block characters, and legible.
- Shall have text that is of a color contrasting with the label so that it may be easily read. If labeling tape is utilized, the font color shall contrast with the background.
- Patch panels shall exhibit workstation numbers, in a sequential order, for all workstations served by the new IDF.
- Shall be completed before testing commences. Labeling discrepancies found during inspection will void all test results.

2.03 Copper Backbone Cable

Description: The backbone cabling used to connect new IDF to the existing MDF, used for voice/data.

- Shall be Category 5e and installation must be in compliance with all EIA/TIA standards.
- Cable must be rated for the environment that it will be installed in, such as plenum, riser or outdoor rated.
- Only Cat 5e 110 punch blocks will be allowed for terminations. Backbone pairs shall be terminated at the top left of the blocks installed in the IDF.
- Each copper backbone cable shall be machine labeled and printed EIA/TIA 606 Section 8 compliant at each end with its respective IDF number/letter. All binder groups shall be tied off with their respective identifying ribbon at every breakout point.

2.04 Wi-Fi Cable

Description: Cabling between Wi-Fi jacks and IDF/MDF’s.

- Shall be blue Category 6A - 802.3bt Type 4 and installation must be in compliance with all EIA/TIA standards.
- Each blue cable shall be terminated at both ends with white Panduit Cat 6A RJ45 jacks.
- Panduit Executive style faceplate shall be used at access point location.
- Wireless access points shall be in every classroom, common areas, and exterior for full campus coverage.

2.05 Workstation Cable

Description: Cabling between workstations and IDF/MDF’s.

- Installation must be in compliance with all EIA/TIA standards.
- Each standard classroom must have a minimum of two workstations:
    - One workstation (the teacher’s) consists of 2 purple Cat 6A cables and 1 grey Cat 6A

cable.
    - The second workstation (the student's) consists of 4 purple Cat 6A cables.
    - Each purple cable shall be terminated at both ends with a beige Panduit Cat 6A RJ45 jacks.
    - Each gray cable shall be terminated, with slack loop at IDF/MDF location with a Cat 6A black RJ45 for VOIP and 110 punch block for non-VOIP. District will identify where to use VOIP and where to non-VOIP. Workstation terminates with a black Panduit, Cat 6A RJ45 jack.
- Panduit LDP series or Panduit T-70 series (both Cat 6A compliant) raceway shall be used on interior walls where raceway is required for station drops.
- Copper station cabling may run outside of conduits and above T-Bar suspended ceilings when available. Cables installed in this fashion must follow these guidelines:
    - Run horizontally in bundles and tie down neatly without the use of zip-ties.
    - Be well clear of any light fixtures or other electrical appliances that may affect data transmissions.
    - Have their own support system, such as J-Hooks or a cable tray
    - Cable tray shall be a minimum of 12"x4" wire mesh and UL listed.
    - Cannot be supported by other items in the ceiling such as conduit, ducts and ceiling grids.

2.06 Fiber Inner Duct

Description: Ducting specifically manufactured to enclose and protect fiber optic cable.

- Must be used for all fiber installations, with exceptions where conduits are too small to run inner duct.
- LUSD will be notified, in writing, that conduits might be too small to run inner duct. LUSD must approve, in writing, any fiber run not in inner duct.

2.07 Fiber Distribution

Description: The backbone cabling used to connect new IDF to the existing MDF.

- Only 50 um-multimode fiber (OM3) shall be used and installation must comply with all EIA/TIA standards.
- Provide 6-strand fiber between the existing MDF and new IDF.
- SC style connectors shall be used for all fiber termination.
- All fiber strands shall be terminated and labeled at both ends with its respective IDF identifier.
- All fiber interconnect devices shall be labeled with their respective IDF identifier.
- At each location where the fiber cable is exposed to human intrusion, it shall be marked with warning tags. These tags shall be yellow or orange in color, and shall contain the warning: "CAUTION FIBER OPTIC CABLE." The text shall be black, block characters and at least 3/16" high. A warning tag shall be permanently affixed to each exposed cable or bundle of cables.

2.08 Main Distribution Facility (MDF)

- existing

2.09 Intermediate Distribution Facility (IDF)

Description: A location in a building that interconnects and manages the telecommunications wiring between the MDF and workstation devices.

- Must be in compliance with all EIA/TIA standards.
- Must have fire treated ¾" plywood inside the cabinet.
- Cabinet must have a dedicated power outlet mounted inside.
- Must have lockable 48" tall, 19-inch, front and rear swing cabinets in unsecured locations.
- Cabinet shall be load tested with no less than 200 pounds and up to rated shear strength.
- Cabinets must adhere to ADA requirements. See Enclosure G
- A Panduit wire manager must be mounted in-between every patch panel (must use one wire management panel for every patch panel).
- A 3-foot slack loop shall be required at IDF for all cables.

2.10 Backboard

Description: Generally, refers to the plywood sheeting lining the back of equipment cabinets.

- Must have fire treated ¾" plywood.
- Dimensions shall be no larger than the cabinet/IDF installed in a classroom.
- Shall be no thinner than 5/8."

2.11 Grounding and Bonding

Description: Generally, refers to the grounding and bonding requirements for telecommunications rooms, including data cabinets, racks, and ladder racking systems. Strictly adhere to all Building Industry Consulting Service International (BICSI), Telecommunications Industry Association (TIA) recommended installation, best practices, codes, and standards when installing the grounding and telecommunications bonding infrastructure.

2.12 Testing and Documentation

Testing: Contractor shall test each fiber strand and each pair of twisted pair copper cable after labeling is 100% complete. LUSD reserves the right to have a representative present during testing.

- **Fiber Optics Cable**: Each strand shall undergo bi-directional testing for signal attenuation losses.
  - Test Equipment:
    - Multi-mode: Fluke DSP 4000 for equivalent.
    - Single-mode: Laser Precision TD2000 OTDR with appropriate modules, or equivalent.
  - Tests:
    - Multi-mode: Bi-directional signal attenuation at 850 and 1300 nm.
  - Test Criteria:
    - Signal loss less than the link loss budget as determined by the tables below.

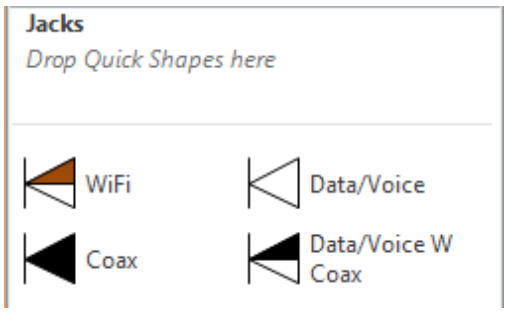
SC Connector Pair	0.5dB
Multi-Mode Cable	
Wavelength (nm)	Maximum Attenuation (dB/km)
850	3.5
1300	1.5

Example: A link with 3 connectors and a total length of 500m should have a maximum attenuation of 3.25dB at 850nm and 2.25dB at 1300nm

- **Workstation Cable:** Each workstation cable shall be tested from the Jack Panel to the data outlet after labeling is completed.
  - Test Equipment: Fluke DSP-4000 or equivalent.
  - Tests: Conform to EIA/TIA Standards for Category 6A.
  - Test Criteria: Tested to Category 6A for permanent link compliance.
- **Wi-Fi Cable:** Each Wi-Fi cable shall be tested from the Jack Panel to the data outlet after labeling is completed.
  - Test Equipment: Fluke DSP-4000 or equivalent.
  - Tests: Conform to EIA/TIA Standards for Category 6A and 802.3bt Type 4.
  - Test Criteria: Tested to Category 6A for permanent link compliance.

Documentation: Contractor shall provide documentation to include test results and Visio “As- Built” drawings in both soft and hard copy format.

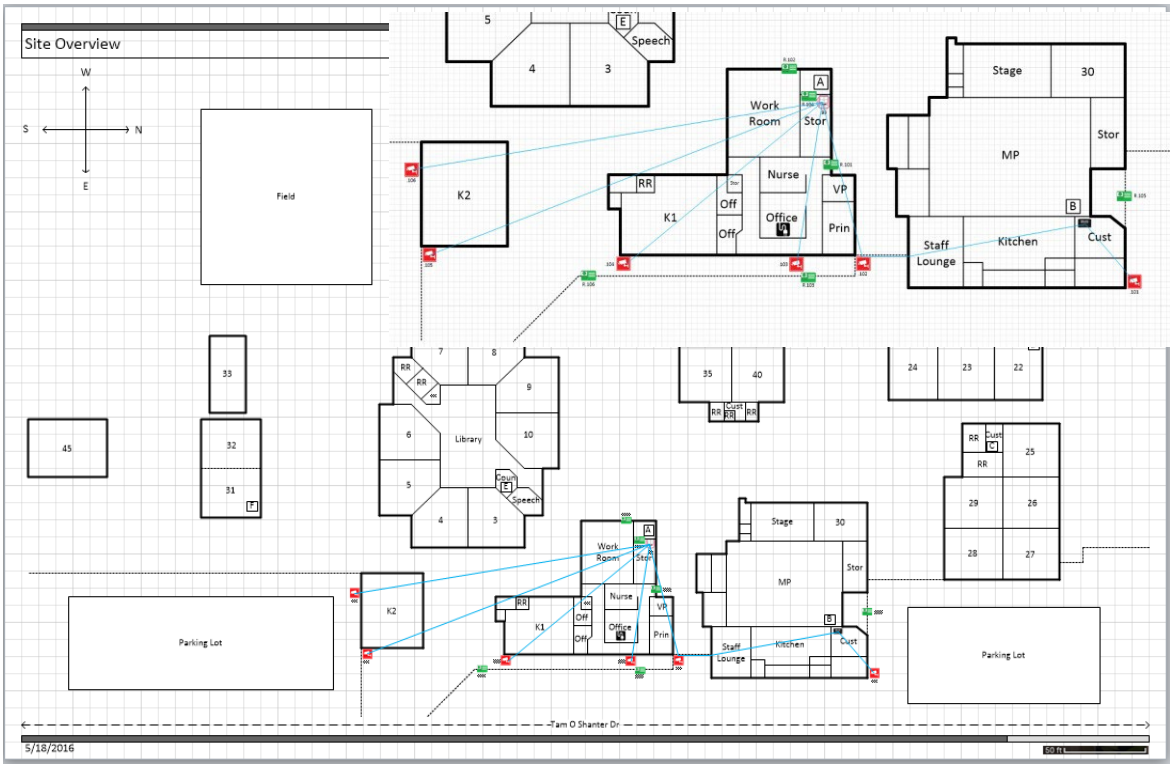
- **Fiber Test Results**: Shall be entered onto the attached form "Fiber Test Results.”
  - Only original signed copies will be acceptable.
  - Hand written results are not acceptable.
  - Copies of test results are not acceptable.
  - Test results shall be in PDF format.
- **Workstation/Wi-Fi Test Results**: Shall be provided in the form of printouts from the test equipment, as well as computer file copies on CD including the software needed to read the results.
  - Only original signed copies will be acceptable.
  - Hand written results are not acceptable.
  - Copies of test results are not acceptable.
  - Test results shall be in PDF format.
- **As-Built Drawings:** Contractor shall produce drawings while adhering to the following guidelines:
  - Always use icons from the Visio stencils provided by LUSD. Not all available icons are shown below.



  - Depiction of backbone cable routing.

  - Submit before final inspection for punch list. Incorrect Visio drawings are punch list items and are to be corrected before re-inspection.
  - Additional copies corresponding to the appropriate IDF/MDF, shall be posted in the MDF’s and IDF’s.

Sample of LUSD Visio drawing



Sample of LUSD Visio Backbone

2.13 Acceptance

Acceptance of the Data Communications System, by LUSD, shall be based on the results of testing, functionality, and the receipt of documentation.

- With regard to testing, all fiber segments and workstation data cables must meet the testing criteria established in Section 2.12 above.
- With regard to functionality, contractor must demonstrate to LUSD that Gigabit Ethernet data signals can be successfully transmitted bi-directionally, from the MDF/IDF to and from a number of individual data outlets.
    - No more than 5% of the data jacks will be tested.
        - If any locations fail, an additional 5% will be tested until no more links fail.
- With regard to documentation, all required documentation shall be submitted to LUSD

PART 3 – EXECUTION

3.01 Division of Work

Contractor shall design and install the data communications system as described in the preceding documentation. Installation shall result in a functional system. The scope of work shall include:

- All necessary conduit and raceway with a Visio drawing showing proposed cable routes, existing conduit to be used, new conduit being installed, equipment racks and approximate drop location. (Note: The EIA/TIA specifies at least 2 drops per workstation location, back to the IDF/MDF).

- Necessary trenching, backfill, replacement of landscape material, repair of damage to utilities or structures, replacement of asphalt and base, and replacement or repair to concrete work resulting from conduit or raceway installation.
- Provide and install all equipment.
- Test and document system upon completion. Copies of all other forms and enclosures shall be included.
- Supply and install all necessary materials resulting in a safe, complete and functional system. The scope of work shall be reviewed by no less than 1 person for completeness from the following departments: Facilities & Planning, Maintenance & Operations.

PART 4 – CONDUIT

4.01 Underground

- Contractor will use PVC schedule 40 underground, with rigid 90-degree elbows and tracer tape placed 6” to 12” over the top of the PVC portions. Elbows shall have a radius of at least 10 times the diameter of the conduit used.
- See NEC for appropriate depths and pull box sizes.
- Should be next to existing underground where possible.
- All new underground conduits shall be (2) 2” plus (1) 2” spare, PVC to support data/voice/intercom/PA. All new underground conduits shall be 2” PVC to support fire alarm.
- Areas near tree roots and other underground utilities will need to be hand dug. LUSD will identify those areas. Pull boxes are to have traffic lid covers (that say Data). The bottom will be grooved with drains installed. LUSD will provide diagrams upon request.

4.02 Aboveground

- All roof penetrations shall be approved by LUSD, before actual penetration is made.
- All exterior conduit that is accessible shall be in rigid conduit.
- A pull rope will be installed in all new and existing conduits used, including underground and interior conduit.
- Firewall penetrations will extend though the wall a minimum of 12 inches.
  - Shall be sealed around the outside with firecaulk.
  - Shall be sealed around the inside with firecaulk duct seal (the depth shall be 50% diameter of the conduit).
  - No innerduct shall be installed in a firewall penetration.
- Conduit size to be determined by EIA/TIA Standards leaving room for future expansion.
- LB’s shall not be used in new and existing conduit for data applications.
- Data/Voice conduits shall service LUSD’s voice and managed IP network only.

4.03 Portable Classrooms

- All conduits to be installed on the exterior of a portable will be approved by LUSD personnel before installation.
- The center beam of a portable shall not be penetrated.

PART 5 – CONCRETE

- ALL concrete and asphalt repair shall be included in the scope of work and will be replaced from joint to joint (no patching, except when done temporarily for safety).
- Soft patch may not be used as a permanent patch for asphalt or concrete.

PART 6 – Change Orders

ALL change orders shall be routed to the department originating the project. Departments are typically Facilities & Planning and Technology Services and will be approved or disapproved on a case by case basis.

Approved change order form will be added to the scope of work and completed as a part of the contract.

PART 7 – Departure from Specifications

During unusual or unique situations, a departure from specifications (DFS) may be granted for specific locations and/or equipment. Approval is granted or denied in writing by Technology Services. See section 1.05 for materials substitutions.

The contractor will keep all forms on file until the warranty on the installation expires.

PART 8 – Asbestos and Lead Containing Paint Waiver

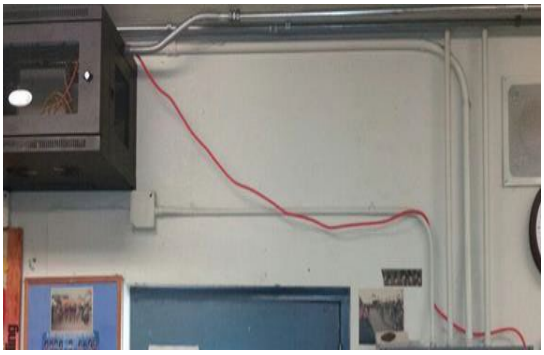
Asbestos work must be performed by M&O approved certified remediation company. Contractor must contact LUSD's Maintenance and Operations (M&O) department for a current list of Asbestos Hazard Emergency Response Act (AHERA) sites, requiring work to be performed by a remediation company.

All District sites will be considered to be a lead containing paint facility unless the area of work has been sampled and determined to be otherwise. All work including but not limited to cutting and/or hole drilling will be performed by a lead awareness trained individual that is also trained in HW collection and disposal activities. Otherwise the contractor must employee the services of an environmental company approved by M&O and certified to perform theses duties. All environmental activity will be reported to the Maintenance & Operation Structural Supervisor at (209) 331-7193 prior to the commencement of work.

PART 9 POWER

All cabinets will have a dedicated circuit/breaker and power sources must be mounted per NEC requirements.

During the initial walk with Technology Services, power sources will be identified. If power source is not available, Technology Services will work with M&O to coordinate the installation of power source. **Powering cabinets with extension cords is not permissible.**



9.01 Miscellaneous

- All wires must be labeled w/ wire-wrap style labels within 3 inches of the jacks.

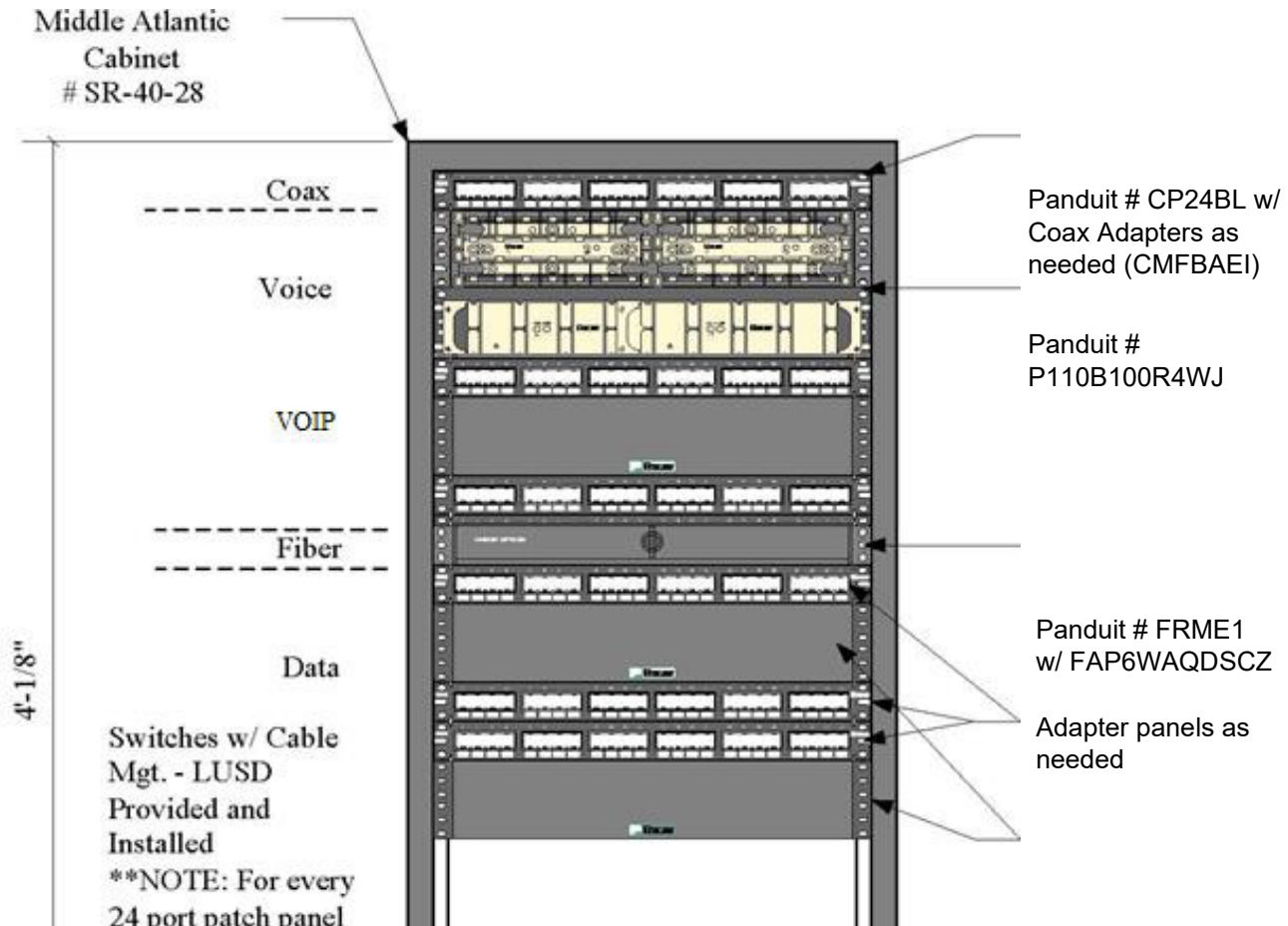
- Jacks should be labeled and tested at both ends of each smallest segment according to Specifications. This type of passive cross connect is no longer allowed.

- As of July 1st, 2016, single gang boxes are not permitted in IDFs.
- This photo depicts what **not** to use anymore.
    - Jacks are now placed in a 24 port patch panel
        - Panduit part #CP24BLY



ENCLOSURE A - LUSD IDF LAYOUT

The Intended layout of ALL 19-inch racks and/or patch panels need to be verified and approved by the LUSD wiring inspector of the I.S. Department before any racks, jacks, or patch panels are mounted.



Panduit # CP24BL w/
CJ6X88TGYL Cat
6A Jacks as

needed Panduit #

WMP1E

ISO Bar RM-12

Cabinet is 26" Deep

ENCLOSURE B – LUSD LABELING FORMAT

The LUSD labeling format is a 4-part identifier that indicates the campus, type of jack, IDF location, room, and jack. Below is a key to determine the jack information and name new locations.

WW-XX-YY-ZZ

CAMPUS AND VOICE OR DATA	MDF OR IDF DESIGNATION	ROOM # OR ABBREVIATION	JACK # (TWO DIGITS)
Data = Even # (Purple) Voice = Odd # (Grey) Video = C (Coax) Card Readers = CR Camera = VS NVR = NVR See Next Page for Voice and Data numbers for each campus.	MDF = A IDF-B = B IDF-C = C etc.	West Admin Office = WA East Admin Office = EA Library = Lib 15 = 15 M2 = M2 etc. Determined by Campus Architect or IT Staff.	01 (1st Jack in Room) 02 (2nd Jack in Room) 03 (3rd Jack in Room) etc. Starts in corner of room and counts clockwise. New jacks increase from last jack.

VOICE EXAMPLE: The first voice jack in room M1 = "09-G-M1-01"

DATA EXAMPLE: The first data jack in room M2 = “10-G-M2-01"

DATA EXAMPLE: The first data jack in room E1 = "10-F-E1-01"

VOICE EXAMPLE: The first voice jack in room E1 = "09-F-E1-01"

DATA EXAMPLE: The first data jack in the West Admin Office = "10-A-

WA-01" CARD READER EXAMPLE: IDF Alpha ID + "CR" + IP ad-

dress node # = DCR101

VIDEO SURVEILLANCE CAMERA EXAMPLE: IDF Alpha ID + "VS" + IP address node

= BVS101 NVR SECURITY EXAMPLE: IDF Alpha ID + "NVR" + IP address node # =

ANVR101

*Dashes do not need to be included. However, the jack number must be two numeric characters Example: “10GM201” instead of “10GM21”

MDF/IDF'S & WORKSTATIONS ALL JACKS ARE TO BE IDENTIFIED WITH THE APPROPRIATE NUMBERING SCHEME.

All numbers must be legibly written on the jacks (or 110 punch panels, etc.) with a black permanent marker and then labeled.

Site Location	Site Numbers	
	Data	Voice
Houston	44	43

ENCLOSURE C – APPROVED LUSD PARTS LIST

CABINET and GROUNDING			
Manufacturer	**Part Number**	**Description**	**Location**
Middle Atlantic	SR-40-28	40 space, black, 90" tall swinging cabinet	MDF/IDF
Middle Atlantic	Lace-44LP	Vertical Lacing Bar	MDF/IDF
Middle Atlantic	QFAN	Accessory Quiet fan for cabinet	MDF/IDF
Panduit	RGW-100-1Y	Paint piercing grounding washer kit	MDF/IDF
Panduit	RGS134-1Y	Rack Grounding Strip Kit	MDF/IDF
Panduit	RGEJ624PHY	Equipment Jumper Grounding Kit, 24" jumpers	MDF/IDF

FIBER PRODUCTS			
Manufacturer	**Part Number**	**Description**	**Location**
Panduit	FRME4	Holds up to 12 FAP or FMP adapter panels	MDF
Panduit	FREM3	Holds up to 9 FAP or FMP adapter panels	MDF
Panduit	FREM2U	Holds up to 6 FAP or FMP adapter panels	MDF
Panduit	FRME1U	Holds up to 3 FAP or FMP adapter panels	IDF
Panduit	FAP3WAQDSC	OM4 SC FAP loaded with 3 SC duplex coupler	MDF/IDF
General Cable	BL0061PNU	OM4 6F 50um MM TB OFNP	Backbone
General Cable	AP0061PNU	OS2 6F SM TB OFNP	Backbone
General Cable	BL0061PNU	OM4 6F 50um MM TB OFNP	Backbone

General Cable	BL0061ANU.BK	OM4 6F 50um MM TB OFNP I/O	Backbone
General Cable	AP0061ANU.BK	OS2 6F SM TB OFNP I/O	Backbone
General Cable	BL0064M1A-DWB	OM4 6F 50um MM LT SINGLE JKT	Backbone
General Cagle	AQ0064M1A-DWB	OS2 6F SM LT SINGLE JKT	Backbone

WIRE MANAGMENT			
Manufacturer	**Part Number**	**Descrip-tion**	**Location**
Panduit	WMP1E (NM2)	Wire Management to be mounted be-tween every 24-port patch panel	MDF/IDF
Panduit	WMPSE (NM1)	Wire Management to be mounted be-tween every switch like component	MDF/IDF

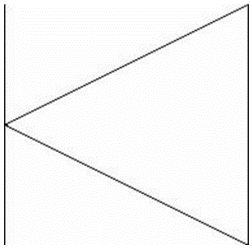
TWISTED PAIR PRODUCTS			
Manufacturer	**Part Number**	**Descrip-tion**	**Location**
Panduit	CP24BL	24 Port Mini-Com patch panel	MDF/IDF
Panduit	CP48BLY	48 Port Mini-Com patch panel (Metal panel)	MDF/IDF/WS
Panduit	CPPL24WBLY	24 Port Mini-Com modular patch panel (Plas-tic)	MDF/IDF/WS
Panduit	FP6X88MTG	TX6A™ Category 6A UTP Field-Term RJ45 Plug	MDF/IDF/WS
Panduit	CJ6X88TGIG	GRAY CAT6A MOD JACK (for Server Loca-tions)	MDF/IDF
Panduit	CJ6X88TGYL	Yellow 6A Mini-Com Jack (Access Control)	Access Con-trol System
Panduit	CJ6X88TGWH	White 6A Min-com Jack (user Station)	WS
Panduit	CJ6X88TGBU	Blue Cat 6A Mini Com Jack (for VoIP)	MDF/IDF/WS
Panduit	CJ6X88TGGR	Green Cat 6A Mini Com Jack (for Intercom)	MDF/IDF/WS
Panduit	CJ6X88TGEI	Electric Ivory Cat 6A Mini Com Jack	WS
Panduit	UTP6XXYL	Non- Shielded Yellow 6A Patch Cord, XX is length	MDF/IDF/WS
Panduit	UTP28X*YL	Cat.6A, 28AWG, Yellow, * = length: 1,3,5,7,19,14 feet	MDF/IDF/WS
Panduit	P110B100R4WJ	19" Rack Mount Panel w 2 100pr 110 punch- down blocks and jumper troughs	MDF/IDF
Panduit	P110CB4-X	4pr 110 Connecting Clips 10pk	MDF/IDF
Panduit	P110CB5-X	5pr 110 Connecting Clips 10pk	MDF/IDF
General Cable	7133825	Purple CAT 6A CMR (for Data at work-stations)	Horizontal

General Cable	7133819	Blue CAT 6A CMR (for Server drops, closets) – Wi-Fi	Horizontal
General Cable	7131823	Green CAT 6A CMP (for Intercom drops, closets)	Horizontal
General Cable	7131823	Green CAT 6A CMP (for Server drops, clos-ets)	Horizontal
General Cable	7133767 (7133803)	Gray CAT 6 CMR 4 Pair wire (for Voice)	Horizontal
Commscope	CM-00424SMX-CF6A-02	SystiMax, Black CAT 6A OSP (Voice and Data)	Horizontal
General Cable	2131550E	Cat.5e, 25 pair CMP, White	MDF/IDF
General Cable	2133269E	Cat.5e, 25 pair CMP, Gray	MDF/IDF
Superior Essex	04-097-31	CAT 5 25 Pair OSP	MDF/IDF

RACEWAY PRODUCTS			
Manufacturer	**Part Number**	**Descrip-tion**	**Location**
Panduit	LD-5	Raceway for Data/Wi-Fi/Access Control System	Wi-Fi/ACS
Panduit	LDP-10	Raceway for Data/Voice/Coax	WorkStation
Panduit	T-70	Raceway for Comp. Lab That will accept communications and power	WorkStation
Panduit	CMBEI-X	Mini-Com Blank Ivory	WorkStation
Panduit	CFPSE4EI	Executive Faceplate Sloped	WorkStation
Panduit	JBX3510EI-A	Single gang Junction box	WorkStation

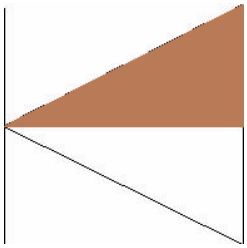
ENCLOSURE D - LUSD TELECOMMUNICATIONS JACK LEGEND

Data/Voice



2/1

Wi-Fi



W1/0

This example has “2” for two data and “1” for one voice.

Data only would be d/0 with “d” as the number of data jacks.

Voice only would be 0/v with “v” as the number of voice jacks.

Category 6A cabling/jacks are indicated by a “W” preceding the number (or jack count)

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and conditions of the contract, including but not limited to General Conditions, and the Special Conditions listed below, apply to work of this section.

1. Supplementary Instructions to Bidders.
2. Supplementary Conditions.
3. Summary of the Work.
4. Project Coordination.
5. Cutting and Patching.
6. Definitions and Standards.
7. Submittals.
8. Schedules and Reports.
9. Temporary Facilities.
10. Security Regulations.
11. Safety and Health.
12. Products.
13. Project Closeout.
14. Section 26 01 00 – General Requirements of Electrical Work
15. Section 26 05 02 – Supporting from Building Structure
16. Section 26 05 34 – Conduit
17. Section 26 05 37 – Boxes

1.02 PROJECT/WORK IDENTIFICATION

A. Contract documents indicate the work of the contract, related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the contract documents include, but are not necessarily limited to, the following:

1. Existing site conditions and restrictions.
2. Other work prior to work of contract.
3. Alterations and coordination with existing work.
4. Other work to be performed concurrently by Owner.
5. Other work to be performed concurrently by separate contractors.
6. Other work subsequent to work of Contract.
7. Requirements for occupancy by Owner prior to completion of work of contract.

1.03 SUMMARY – FIRE

A. This performance specification provides the minimum requirements for the Life Safety System. The system shall include, but not limited to all equipment, materials, labor, documentation and services necessary to furnish and install a complete, operational system to include but not limited to the following functions:

1. Smoke, carbon monoxide, and fire detection.
2. Sprinkler suppression system monitoring and control.
3. Off-premise notification.

1.04 PROJECT REPRESENTATIVES

A. All contacts with the Project Building shall be directed to the Owner's Representative, hereafter referred to as the Architect.

1.05 INTERPRETATION

A. No interpretations of the meaning of the bid documents will be made to any bidder orally. Each request for such interpretation shall be made to the engineer in writing, addressed to the Architect of Record.

B. Written requests for interpretation will be received until 10 days prior to bid date.

1.06 MANUFACTURER

A. Acceptable fire alarm system manufacturers include:

1. Edwards EST, Wheelock.
2. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system and smoke control system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

3. The contractor shall provide, from the acceptable manufacturer's current product lines, equipment and components, which comply, with the requirements of these specifications. Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.

1.07 ALTERNATES – FIRE

A. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed and will accommodate the future requirements

and operations of the building owner. All specified operational features must be met without exception.

B. The authorized representative of the manufacturer of the major equipment shall be responsible for the satisfactory installation of the complete system.

C. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling system, access control, and smoke control. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

D. All control panel assemblies and connected field appliances shall be provided by the same system supplier, and shall be designed and tested to ensure that the system operates as specified. The system shall utilize independently addressed, microprocessor-based smoke detectors, heat detectors, as described in this specification.

E. All equipment and components shall be installed in strict compliance with the manufacturer's recommendations.

F. The equipment to be supplied will be considered only if it meets all sections of the performance specification. Any deviations of system performance outlined in this specification will only be considered when the following requirements have been met:

G. A complete description of proposed alternate system performance methods with three (3) copies of working drawings thereof for approval by the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.

H. The supplier shall furnish evidence that the proposed or alternate system performance is equal or superior to the system operation stated in the specification. Such evidence shall be submitted to and accepted by the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.

I. The supplier shall submit a point-by-point statement of compliance for all sections in this specification. The statement of compliance shall consist of a list of all paragraphs within these sections. Where the proposed system complies fully with the paragraph as written, placing the word "comply" opposite the paragraph number shall indicate such. Where the proposed system does not comply with the paragraph as written and the supplier feels the proposed system will accomplish the intent of the paragraph, a full description of the function as well as a full narrative description of how its proposal will meet its intent shall be provided. Any submission that does not include a point by point statement of compliance as described herein shall be disqualified. Where a full description is not provided, it shall be assumed that the proposed system does not comply.

J. The acceptability of any alternate proposed system shall be the sole decision of the Owner or his authorized representative.

1.08 REFERENCES

A. Definitions and abbreviations – general:

1. ADA: Americans with Disabilities Act.
2. AFF: Above Finished Floor.
3. AHJ: Authority Having Jurisdiction.
4. Approved: Unless otherwise stated, materials, equipment or submittals approved by the Authority or AHJ.
5. Circuit: Wire path from a group of devices or appliances to a control panel or transponder.
6. CPU: The central computer of a multiplex fire alarm or voice command control system.
7. CRC: Card Reader Controller
8. CRT: Cathode Ray Tube.
9. FACP: Fire Alarm Control Panel.
10. FCC: Fire Command Center.
11. FSCP: Firefighter's Smoke Control Panel
12. HVAC: Heating Ventilating and Air Conditioning.
13. IDC: Initiating Device Circuit.
14. LED: Light Emitting Diode.
15. LCD: Liquid Crystal Display.
16. NFPA: National Fire Protection Association.
17. NAC: Notification Appliance Circuit.
18. NCP: Local Network Control Panel.
19. PTR: Printer.
20. RCP Remote Control Panel
21. SLC: Signaling Line Circuit.
22. Style 1: As defined by NFPA 72, Class B.
23. Style 4: As defined by NFPA 72, Class B.
24. Style 6: As defined by NFPA 72, Class A.
25. Style 7: As defined by NFPA 72, Class A.
26. Style B: As defined in NFPA 72, Class B.
27. Style D: As defined in NFPA 72, Class A.
28. Style Y: As defined in NFPA 72, Class B.
29. UL or ULI: Underwriters Laboratories, Inc.

30. UL Listed: Materials or equipment listed and included in the most recent edition of the UL Fire Protection Equipment Directory.
31. Zone: Combination of one or more circuits or devices in a defined building area, i.e. 3 speaker circuits on a floor combined to form a single zone.

1.09 CODES – GENERAL

A. All work and materials shall conform to all applicable Federal, State and local codes and regulations governing the installation. If there is a conflict between the referenced standards, federal, state or local codes, and this specification, it is the bidder's responsibility to immediately bring the conflict to the attention of the Engineer for resolution. National standards shall prevail unless local codes are more stringent. The bidder shall not attempt to resolve conflicts directly with the local authorities unless specifically authorized by the Engineer.

B. System components proposed in this specification shall be ULI listed to operate together as a system. The supplier shall provide evidence, with his submittal, of listings of all proposed equipment and combinations of equipment. The supplier shall be responsible for filing of all documents, paying all fees (including, but not limited to plan checking and permit) and securing all permits, inspections and approvals. Upon receipt of approved drawings from the authority having jurisdiction, the supplier shall immediately forward two sets of drawings to the Owner. These drawings shall either be stamped approved or a copy of the letter stating approval shall be included.

1.010 CODES - FIRE

A. The equipment and installation shall comply with the current provisions of the following codes and standards:

1. NFPA 70 - 2019 National Electric Code®
2. NFPA 72 – 2019 National Fire Alarm Code®
3. NFPA 101- 2018 Life Safety Code®
4. UL 864 - Control Units for Fire Protective Signaling Systems.
5. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
6. UL 268A - Smoke Detectors for Duct Applications.
7. UL 217 - Single and Multiple Station Smoke Alarms
8. UL 521 - Heat Detectors for Fire Protective Signaling Systems.
9. UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.
10. UL 464 - Audible Signaling Appliances.
11. UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems.
12. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
13. UL 1971 - Signaling Devices for the Hearing-Impaired.

14. UL 1481 - Power Supplies for Fire Protective Signaling Systems.
15. UL 1711 - Amplifiers for Fire Protective Signaling Systems.
16. UL 1635 - Digital Alarm Communicator System Units.
17. Department of State Architect.
18. California State Fire Marshall.
19. Federal Codes and Regulations.
20. Americans with Disabilities Act (ADA).
21. Faory Mutual (FM) approval.
22. International Standards Organization (ISO).
    a. ISO-9000
    b. ISO-9001
23. Electromagnetic Compatibility Requirements.

1.011 SYSTEM DESCRIPTION

A. General – Fire: The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional fire alarm system. The System shall comply in respects with all pertinent codes, rules, regulations and laws of the Authority, and local jurisdiction. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.

B. It is further intended that upon completion of this work, the Owner be provided with:

C. Complete information and drawings describing and depicting the entire system(s) as installed, including all information necessary for maintaining, troubleshooting, and/or expanding the system(s) at a future date.

1. Complete documentation of system(s) testing.
2. Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is/are in proper working order. Fire Alarm System shall be tested only when the system is 100% complete. Contractor shall use "Fire Alarm System Certification and Description" as required by NFPA 72 - 2016 edition.
3. Manufacturer supplied training to allow district personnel to access and program Fire Alarm system.

1.012 DESCRIPTION – FIRE

A. Provide and install an extension to an existing fire detection and alarm system consisting of:

1. Voice evacuation capability to existing fire alarm control panel.
2. Area smoke detection shall be provided as shown on drawings.
3. Area heat detection shall be provided as shown on drawings.
4. Provide audible appliances located throughout the building(s), as shown on the

drawings.

5. Provide synchronized visual appliances located throughout the building, as shown on the drawings.

1.013 SEQUENCE OF OPERATIONS

A. General:

1. Upon the alarm activation of any area smoke detector, heat detector, manual pull station, duct detector, the following functions shall automatically occur:
2. The internal audible device shall sound at the control panel or command center.
3. The LCD display shall indicate all applicable information associated with the alarm condition including; zone, device type, device location and time/date.
4. All system activity/events shall be documented on the system printer.
5. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
6. Activate notification audible. Notification upon activation of a carbon monoxide detector shall be descriptively annunciated such that audible notification for fire alarm is different than notification for carbon monoxide alarm.
7. Activate visual strobes notification appliances. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.
8. Transmit signal to the central station with point identification.
9. Activate automatic smoke control sequences.
10. All automatic events programmed to the alarm point shall be executed and the associated outputs activate
11. All self-closing fire/smoke doors held open shall be released.
12. Transmit alarm text messages to "alpha-numerical" display pagers.

B. Supervisory Operation:

1. Upon supervisory activation of any sprinkler valve supervisory switch, the following functions shall automatically occur:
2. The internal audible device shall sound at the control panel or command center.
3. The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
4. All system activity/events shall be documented on the system printer.
5. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
6. Transmit signal to the central station with point identification.
7. Activate notification audible. Notification upon activation of a carbon monoxide detector shall be descriptively annunciated such that audible notification for fire alarm is different than notification for carbon monoxide alarm.
8. Activate visual strobes notification appliances. The visual strobe shall continue to flash

until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.

C. Trouble Operation:
   1. Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:
   2. The internal audible device shall sound at the control panel or command center.
   3. The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.
   4. All system activity/events shall be documented on the system printer.
   5. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
   6. Transmit signal to the central station with point identification.

D. Monitor Activation:
   1. Upon activation of any device connected to a monitor circuit, the following functions shall automatically occur:
   2. The internal audible device shall sound at the control panel or command center.
   3. The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.
   4. All system activity/events shall be documented on the system printer.
   5. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.

1.014 SYSTEM CONFIGURATION

A. General: All Life Safety System equipment shall be arranged and programmed to provide the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants.

B. Power Supply: Standby power supply shall be an electrical battery with capacity to operate the system under maximum supervisory load for 24 hours and capable of operating the system for 15 minutes in the alarm mode at 100% load. The system shall include a charging circuit to automatically maintain the electrical charge of the battery. The system shall automatically adjust the charging of the battery to compensate for temperature.

C. Display: existing

D. Initiating Device Circuits: existing – provide additional capabilities for new added initiation devices.

E. Notification Appliance Circuits: All notification appliance circuits shall be Class B (Style "Y"). All notification appliance circuits shall have a minimum circuit output rating of: 2 amps @ 24 vdc. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

F. DACT: existing.

1.015 SUBMITTALS

A. Project:

1. The contractor shall purchase no equipment for the system specified herein until the owner has approved the project submittals in their entirety and has returned them to the contractor. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications. The contractor shall submit three (3) complete sets of documentation within 30 calendar days after award of purchase order.
2. Each submittal shall include a cover letter providing a list of each variation that the submittal may have from the requirements of the contract documents. In addition the Contractor shall provide specific notation on each shop drawing, sample, catalog cut, data sheet, installation manual, etc. submitted for review and approval, of each such variation.
3. All drawings and diagrams shall include the contractor's title block, complete with drawing title, contractor's name, and address, date including revisions, and preparer and reviewer's initials

B. Product Data: Data sheets with the printed logo or trademark of the manufacturer for all equipment. Indicated in the documentation will be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Architect/Engineer.

C. Shop Drawings:

1. A complete set of shop drawings shall be supplied. The shop drawings shall be reproduced electronically in digital format. This package shall include but not be limited to:
    a. Addition to existing control panel wiring and interconnection schematics.
    b. Complete point-to-point wiring diagrams.
    c. Riser diagrams.
    d. Complete floor plan drawing locating all system devices and 1/4' = 1'-0 scale plan and elevation of all equipment in the Fire Command Station. Including showing the placement of each individual item of fire alarm, security, and access control equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.
    e. Detailed system operational description. Any Specification differences and deviations shall be clearly noted and marked.
    f. Complete system bill of material.
    g. All drawings shall be reviewed and signed off by an individual having a minimum of a NICET certification in fire protection engineering technology, subfield of fire alarm systems.

D. Samples: A sample of each smoke detector, intelligent modules, speaker, strobes, card reader controller, card reader, and door locking mechanism shall be provided to the contractor for their familiarization.

E. Quality Assurance /Control Submittals – Installer's Certification:

1. The engineered systems distributor must be licensed in the state of project location and have been incorporated in the business in that state for a minimum of 5 years.
2. Submit a copy of the system supplier's training certification issued by the manufacturer of the integrated life safety system, and a copy of the installing technician's NICET certification.

F. System Calculations: Complete calculations shall be provided which show the electrical load on the following system components:

1. Each system power supply, including stand alone booster supplies.
2. Each standby power supply (batteries).
3. Each notification appliance circuit.

G. Close Out:

1. Two (2) copies of the following documents shall be delivered to the building owner's representative at the time of system acceptance. The close out submittals shall include:
   a. Project specific operating manuals covering the installed integrated life safety system. The manual shall contain a detailed narrative description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, sequence of operations, expansion capability, application considerations and limitations. Manufacturer's data sheets and installation manuals/instructions for all equipment supplied. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
2. As-Built drawings consisting of: a scaled plan of each building showing the placement of each individual item of the Integrated Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system. Supply one set of as-built drawings, to be installed in lockable print holder (tube style) located at Main FACP, on site.
3. All drawings shall be provided in standard .DXF format. A vellum plot of each sheet shall also be provided.
4. The application program listing for the system as installed at the time of acceptance by the building owner and/or local AHJ (disk, hard copy printout, and all required passwords).
5. Provide the name, address and telephone of the authorized factory representative.
6. A filled out Record of Completion similar to NFPA 72, 2002 edition figure 4.5.2.1.
7. Provide a detailed test report of the final commissioning of the Fire Alarm System. Report shall include the number of devices installed within each building.

1.016 QUALITY ASSURANCE

A. Qualifications of Contractor – Fire:

1. The contractor shall have successfully installed similar system fire detection, evacuation voice and visual signaling control components on a previous project of comparable size and complexity. The owner reserves the right to reject any control components for which evidence of a successful prior installation performed by the contractor cannot be provided.
2. The contractor shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote control equipment. Qualified and approved representatives of the system manufacturer shall produce all panel and equipment drawings and submittals, operating manuals. The contractor is responsible for retaining qualified and approved representative(s) of those system manufacturers specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

B. Pre-installation requirements:

1. The provider shall submit a detailed project plan that will describe in detail how the provider will approach the project, from inception to finalization. The plan must include at a minimum the following information:
   a. Project Staging
   b. Project Management
   c. Equipment Schedules
   d. Installation Time Lines
   e. Other Trade Requirements
   f. Final Acceptance Testing
   g. Personnel Resumes
   h. Progress Report Sample
2. All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the manufacturer’s riser/connection diagram and details for all specific system installation/termination/wiring data.

C. Start and Completion Dates: The starting and completion dates for this work will be established at the pre-bid meeting.

1.017 DELIVERY, STORAGE AND HANDLING

A. Receiving and Handling:

1. The Contractor shall be responsible for all receiving, handling, and storage of his materials at the job site.
2. Use of loading docks, service driveways, and freight elevators shall be coordinated with the Owner.

1.018 PROJECT CONDITIONS

A. It shall be the Contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed. Inspection of the building may be made by appointment with the Owner. Contractors are requested to inspect the building prior to the pre-bid meeting.

B. A pre-bid meeting will be held to familiarize the Contractors with the project. Failure to attend the pre-bid meeting may be considered cause for rejection of the Contractor's bid. The minutes of this meeting will be distributed to all attendees and shall constitute an addendum to these specifications.

C. The Contractor shall be responsible for prior coordination of all work and demolition with the Owner.

1.019 WARRANTY AND MAINTENANCE

A. Spare Parts – Fire: The Contractor shall supply the following spare parts:

1. Automatic detection devices - Two (2) percent of the installed quantity of each type.
2. Audible and visible devices - One (1) percent of the installed quantity of each type, but no less than two (2) devices.
3. Keys - A minimum of three (3) sets of keys shall be provided and appropriately identified.

B. Warranty:

1. The contractor shall warranty all materials, installation and workmanship for one (1) year from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with closeout documentation and included with the operation and installation manuals.
2. The System Supplier shall maintain a service organization with adequate spare parts stock within 25 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.

C. TRAINING

D. The System Supplier shall schedule and present a minimum of 8 hours of documented formalized instruction for the building owner, detailing the proper operation of the installed System.

E. The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

F. The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.

G. Instruction shall be made available to the Local Municipal Fire Department if requested by the Local Authority Having Jurisdiction.

PART 2 – PRODUCTS

2.01 MANUFACTURER – FIRE

A. New voice evacuation addition shall be compatible with existing fire alarm control panel – Edwards EST3

2.02 PANEL COMPONENTS & FUNCTIONS

A. Existing Control Panel with added Emergency Communication System:

1. The fire alarm control panel (FACP) is existing – Edwards EST3.
2. The added system must contain number of amplifiers, as shown on the plans and shall be expandable up to 500 watts utilizing maximum of 4 amplifiers. The amplifiers shall have 4 onboard audio circuits and be able to support a 4-zone splitter to distribute the audio information to different locations in the installation.
3. The emergency communication system must have the capability of downloading fifteen (15) 60 second messages and utilize DSP technology for higher audio intelligibility.
4. The emergency communication system shall be capable of operating at 25vrms or 70.7vrms and must be field selectable at the amplifier level. Systems that require additional modules for voltage conversion shall not be accepted.

2.03 SYSTEM WIRING

A. The Signaling Line Circuit (SLC) shall be wired with standard NEC 760 compliant wiring. No twisted, shielded or mid capacitance wiring is required for standard installations. All system wiring shall be in accordance with the requirements of NFPA 70, the National Electrical Code (NEC), and also comply with article 760 of the NEC.

2.04 ADDRESSABLE NOTIFICATION MODULE

A. The contractor shall furnish and install where indicated on the plans, addressable notification modules. The modules shall be U.L. listed compatible with fire alarm control panel. The notification module must provide one class A (Style Z) or class B (Style Y) notification output with one auxiliary power input. The notification module must be suitable for mounting in a standard 4 square electrical box and must include a plastic cover plate. The notification module must provide an LED that is visible from the outside of the cover plate. The notification module must be fully programmable for such applications as required by the installation. The module shall reside on the SLC loop and can be placed up to 5,000 feet from the loop module.

2.05 DIGITAL COMMUNICATOR

A. Existing.

2.06 FIELD MOUNTED SYSTEM COMPONENTS – FIRE INITIATING DEVICES

A. Analog Addressable Smoke – General:

1. Smoke detectors shall be photoelectric type, ceiling mounted. The combination detector head and twist lock base shall be U.L. listed compatible with the fire alarm control panel. The base shall permit direct interchange with other type of detectors.
2. The smoke detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel's reset switch. The sensitivity of the detector shall be capable of being selected and measured by the control panel without the need for external test equipment. The vandal security-locking feature shall be used in those areas as indicated on the drawing.
3. The locking feature shall be field selectable when required. It shall be possible to perform a sensitivity test of the detector without the need of generating smoke. The test method shall simulate the effects of products of combustion in the chamber to ensure testing of the detector circuits.
4. Detectors shall have completely closed back to restrict entry of dust and air turbulence and have a 30-mesh insect screen. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

B. Heat Detectors:

1. Furnish and install analog/addressable heat detectors as described on the plans. The combination heat detector and twist lock base shall be U.L. listed compatible with the fire alarm control panel. The base shall permit direct interchange with other detectors.
2. The heat detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel's reset switch. The vandal security-locking feature shall be used in those areas as indicated on the drawings. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.2.6

2.07 NOTIFICATION APPLIANCES

A. Low Profile Speakers: Provide low profile wall mount speakers at the locations shown on the drawings. The speaker shall provide an 84 dBA sound output at 10 ft. when measured in reverberation room per UL-464. The speaker shall have a selectable steady or synchronized temporal output. In and out screw terminals shall be provided for wiring. The speaker shall mount in a North American 1-gang box.

B. Low Profile Speaker-Strobes: Provide low profile wall mount speaker/strobes at the locations shown on the drawings. The speaker/strobe shall provide an audible output of 84 dBA at 10 ft. when measured in reverberation room per UL-464. Strobes shall provide synchronized flash outputs. The strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd & 110cd devices. The speaker shall have a selectable steady or synchronized temporal output. In and out screw terminals shall be provided for wiring. Low profile speaker/strobes shall mount in a North American 1-gang box.

C. Low Profile Strobes: Provide low profile wall mounted strobes at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Strobes shall provide synchronized flash outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd, or 110cd devices. Low profile strobes shall mount in a North American 1-gang box.

D. General:

1. All appliances which are supplied for the requirements of this specification shall be UL Listed for Fire Protective Service, and shall be capable of providing the "equivalent facilitation" which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA (AG)), and shall be UL 1971 Listed.
2. All appliances shall be of the same manufacturer as the fire alarm control panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturer's instructions.
3. Any appliances that do not meet the above requirements, and are submitted for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers that clearly states that their equipment (as submitted) is 100% compatible with each other for the purpose intended. All strobes shall be provided with lens markings oriented for wall mounting.
4. All notification appliances shall be red unless noted otherwise on the drawings.

2.08 INITIATION & CONTROL MODULES

A. Relay Module: Provide addressable control relay circuit modules at the locations shown on the drawings. The module shall provide one (1) form C dry relay contacts rated at 24Vdc @ 2 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware.

B. Monitor Module: Provide addressable monitor modules at the locations shown on the drawings. The monitor module shall supports Class A supervised or Class B supervised wiring to the load device.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install Sequence:

1. Installation of the systems shall be conducted in stages and phased such that circuits and equipment are installed in the following order:
2. Riser conduits, AC power conduits and control cabinets.
3. Fire command center, remote control panel(s), control component(s), annunciator(s), remote CRT terminal(s), and printer(s). Provide temporary mounting of fire command center in <location.>
4. Conduits and wiring for complete notification circuits and appliance installation

throughout facility.

5. Pre-test the audible and visual notification appliance circuits.
6. Install all new detection devices.
7. Terminations between field devices and the associated control equipment.
8. The detection system shall be switched over and end of each day the system shall be operational. At no time will the system be placed out of service over night.
9. Complete the interface to the building automation system.
10. Complete contractor pre-test of system.
11. Complete system testing.

B. General: All equipment shall be attached to walls and ceiling/floor assemblies and shall be mounted firmly in place. Detectors shall not be supported solely by suspended ceilings. Fasteners and supports shall be sized to support the required load.

C. Conductors:

1. The requirement of this section apply to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.
2. All circuits shall be rated power limited in accordance with NEC Article 760.
3. Installed in conduit or enclosed raceway.
4. The existing cable/wiring may be re-used providing they meet the manufacturer's published wiring requirements.
5. All new system conductors shall be of the type(s) specified herein.
6. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.
7. All signaling line circuits, including all addressable initiating device circuits shall be 16 AWG minimum multi-conductor jacketed twisted cable or twisted shielded or as per manufacturer's requirements.
8. All notification appliance circuit conductors shall be solid copper or bunch tinned (bonded) stranded copper. Where stranded conductors are utilized, a maximum of 19 strands shall be permitted for No. 12 and larger conductors.
9. All audible notification appliance circuits shall be 12 AWG minimum twisted pairs or twisted pairs shielded or per manufacturer's requirements.
10. All visual notification appliance circuits shall be 12 AWG minimum THHN or twisted pairs or twisted shielded pairs or per manufacturer's requirements.

D. Conductors and Raceway:

1. Except as otherwise required by, the installation of all system circuits shall conform to the requirements of Article 760 and raceway installation to the applicable sections of Chapter 3 of NFPA 70 - 2019, National Electrical Code. Fire alarm circuit wiring shall include all circuits described in Section 760-1 including Fine Print Note No. 1 (FPN No. 1), and as defined by the manufacturer's UL listing.

2. The entire system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type required by the NEC and approved by local authorities having jurisdiction for the purpose.
3. Any shorts, opens, or grounds found on new or existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.
4. The contractor shall neatly tie-wrap all field-wiring conductors in the gutter spaces of the control panels and secure the wiring away from all circuit boards and control equipment components. All field-wiring circuits shall be neatly and legibly labeled in the control panel. No wiring except home runs from life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures. No wiring splices shall be permitted in a control panel enclosure.
5. All penetration of floor slabs and firewalls shall be fire stopped in accordance with all local fire codes.

E. Conduit Raceway:

1. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
2. The requirements of this section apply to all system conduits, raceways, electrical enclosures, junction boxes, pull boxes and device back boxes.
3. All system conduits shall be of the sizes and types specified.
4. All system conduits shall be EMT, 3/4 -inch minimum, except for flexible metallic conduit used for whips to devices only, maximum length 6 feet, 3/4-inch diameter, minimum.
5. All system conduits shall be installed in accordance with Electrical Specifications Sections in Division 26.
6. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40%.
7. Provide all new conduit raceway and conduit riser.
8. Existing conduit raceway system may be re-used where possible.
9. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or by fire damage, and so as not to interfere with existing building systems, facilities or equipment, and to facilitate service and minimize maintenance.
10. All conduits, except flexible conduit whips to devices, shall be solidly attached to building structural members, ceiling slabs or permanent walls. Conduits shall not be attached to existing conduit, duct work, cable trays, other ceiling equipment, drop ceiling hangers/grids or partition walls, except where necessary to connect to initiating, notification, or auxiliary function devices.
11. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures

and device back boxes shall be readily accessible for inspection, testing, service and maintenance.

F. Identification and Labels:

1. Label each FACP with a printed label that contains the following information:
2. Fire alarm panel number.
3. Supply power feed designation.
4. Label wires at each device with the designated zone and device number.
5. Submit and affix in a clear folder, to the inside door of the control panel, a plot plan of the site that will identify the following:
   a. Location of each fire Alarm Control Panel
   b. Location of supply power for each control panel
   c. General location of the designated zone as per the FACP programming.

3.02 FIELD QUALITY CONTROL – TESTING AND INSPECTIONS

A. All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.

B. All wiring shall be tested for continuity, shorts, and grounds before the system is activated.

C. All test equipment, instruments, tools and labor required to conduct the tests shall be made available by the installing contractor.

D. The system including all its sequence of operations shall be demonstrated to the Owner, his representative, and the local fire inspector. In the event the system does not operate properly, the test shall be terminated. Corrections shall be made and the testing procedure shall be repeated until it is acceptable to the Owner, his representatives and the fire inspector.

E. A final 100% test & inspection shall be performed by a factory trained representative of the system manufacturer only when the system is 100% complete. At the final 100% test and inspection, the representative shall demonstrate that the system functions properly in accordance with these specifications. The representative shall provide technical supervision and participate during all of the testing for the system.

F. All fire alarm testing shall be in accordance with National Fire Alarm Code, NFPA 72 - 2016, Chapter 7.

G. A letter from the Contractor certifying that the system is installed entirely in accordance with the system manufacturer's recommendations and within the limitations of the required listings and approvals, that all system hardware and software has been visually inspected and functionally tested by a manufacturer's certified representative, and that the system is in proper working order.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 01 57 13, Erosion Control

C. Section 31 23 33, Trenching and Backfilling.

D. Section 32 12 00, Asphalt Concrete Paving.

E. Section 32 16 00, Site Concrete.

F. Section 33 40 00, Site Drainage.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting of inadequate compaction or moisture content is the sole responsibility of the contractor.

D. Tests (See Part 3 for Compaction Testing).

E. Contractor shall be solely responsible for all subgrades built. Failures resulting from inadequate compaction or moisture content are the responsibility of the contractor. Contractor shall be solely responsible for any and all repairs.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for

use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.05 WARRANTY

A. Refer to General Conditions.

1.06 REFERENCES AND STANDARDS

A. General: Site survey, included in the drawings, was prepared by Warren Consulting Engineers and is the basis for data regarding current conditions. While the survey is deemed generally accurate, there exists discrepancies and variations due to elapsed time, weather, etc. Existing dirt grades may vary 0.2 ft. from that shown.

B. Geotechnical Engineering Report was prepared by Wallace Kuhl & Associates. Report is entitled Geotechnical Engineering and Geologic Hazards Report Lodi Middle School Modular Classroom Building P2, WKA No. 4630.2200036.0016, and is on file with Architect. Recommendations of the Goetechnical report were used to develop the contract plans and specifications. The Geotechnical report shall be used as a reference for the soil condition of the project site. The design information contained in the contract plans and specifications shall govern over the recommendation of the Geotechnical report.

C. Site Visitation: All bidders interfacing with existing conditions shall visit the site prior to bid to verify general conditions of improvements. Discrepancies must be reported prior to the bid for clarification.

D. ANSI/ASTM D698-e1 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

E. ANSI/ASTM D1556-e1 - Test Method for Density of Soil in Place by the Sand-Cone Method.

F. ANSI/ASTM 698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

G. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

H. ANSI/ASTM D 4318-10e1 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

I. CALTRANS Standard Specifications Section 17.

J. CAL-OSHA, Title 8, Section 1590 (e).

K. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

B. Excavation dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for excavation dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.09 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 ON SITE UTILITY VERIFICATION AND REPAIR PROCEDURES

A. Ground-breaking requirements:

1. All underground work performed by a Contractor must be authorized by the District’s Construction Manager or the Low Voltage Consultant prior to start of construction.
2. The Contractor is to obtain and keep the original School’s construction utility site plans on site during all excavation operations. Contractor can contact the District’s Construction Manager, Facilities Manager, or the Low Voltage Consultant to procure the drawings.

B. Underground Utility Locating:

1. The contractor shall hire an Underground Utility Locating Service to locate existing underground utility pathways in areas affected by the scope of work for excavation.
2. Contractor must use an underground utility locator service with a minimum of 3 years’ experience. The equipment operator must have demonstrated experience.
3. The Underground Utility Locator Service must have the use of equipment with the ability to locate by means of inductive clamping, induction, inductive metal detection, conductive coupling, or TransOnde (Radio detection) to generate signals, passive locating (free scoping) for “hot” electric, and metal detector.

4. The Underground Utility Locator Service must be able to locate existing utilities at a depth of at least 72”.
5. The Underground Utility Locator Service must be able to locate but are not limited to locating the following types of utility pathways:
   a) All conduit pathways containing 110 volt or greater 50-60Hz electrical wire.
   b) All conduit pathways containing an active cable TV system.
   c) All conduit pathways containing wire or conductor in which a signal can be attached and generated without damaging or triggering the existing systems.
   d) All empty conduit pathways or pipe in which a signal probe or sonde (miniature transmitter) can be inserted.
   e) All conduit pathways containing non-conductive cables or wires in which a signal probe or sonde (miniature transmitter) can be inserted.
   f) All plastic and other nonconductive water lines in which a TransOnde Radio detection) or other “transmitter” can be applied to create a low frequency pressure waive (signal) without damaging or triggering the existing systems.
   g) All copper or steel waterlines and plastic or steel gas lines
6. All markings made by the Underground Utility Locator Service or other shall be clear and visible.
7. The contractor shall maintain all markings made by Underground Utility Locator Service or other throughout the entire length of the project.
8. The Underground Utility Locator Service shall provide the contractor with two sets of maps showing the location of utilities and average depth. They will be referenced to permanent buildings. Contractor will deliver one copy to the district at no additional charge.
9. Contractor is responsible to contact Underground Service Alert (U.S.A. 800/227-2600) and receive clearance prior to any excavation operations.
10. Contractor shall inform the (District’s Construction Manager) (Architect) (Owner) no later than five (5) days prior to the date scheduled for the utility locator service to be on site.

1.11 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

1.12 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Excessively wet fill material shall be bladed and aerated per section 3.08, B.

1.13 TESTING

A. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and back charged to Contractor.

1. If Contractor elects to process or mine onsite materials for use as Suitable Fill, Aggregate Sub Base, Aggregate Base, Rock, Crushed Rock or sand the cost of all testing of this material shall be paid for by the Contractor.
2. Testing of import fill for compliance with Department of Toxic Substance Control (DTSC) shall be paid for by the Contractor.

1.14 ARCHEOLOGICAL AND CULTURAL RESOURCES

A. If archeological or cultural resources are discovered during the Work, the Contractor must cease all construction operations in the vicinity of the discovery until a qualified archeologist can assess the value of these resources and make recommendations to the State Historic Preservation Officer. Archeological and cultural resources include artifacts, large amounts of bone, shell, or flaked stone, and other evidence of human activity. If the State Historic Preservation Officer or the Owner directs that work be temporarily ceased at the location of an archeological or cultural find, the Contractor must temporarily suspend work at the location.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Engineered Fill Materials: All fill shall be of approved local materials supplemented by imported fill if necessary. "Approved" local materials are defined as local soils tested and approved by Geotechnical Engineer free from debris, and concentrations of clay and organics; and contain rocks no larger than 3-inches in greatest dimension. The soil and rock should be thoroughly blended so that all rock is surrounded by soil. This may require mixing of the soil and rock with a dozer prior to placement and compaction. Clods, rocks, hard lumps or cobbles exceeding 3 inches in final size shall not be allowed in the upper 12 inches of any fill. Native clay or clayey soils will not be permitted within the upper 12 inches of building pad areas or paved areas.

B. Imported Engineered Fill Material: Imported fill may be required to complete work. Proposed import fill material shall meet the above requirements; shall be similar to the native soils. Import fill shall meet the above requirements; shall have plasticity index of 12 or less; an Expansion Index of 20 or less; be free of particles greater than 3 inches in largest dimension; be free of contaminants and have corrosion characteristics within the acceptable limits. All import fill material shall be tested and approved by Soils Engineer prior to transportation to the site. Proposed fill material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.

1. DTSC TESTING: Site work contractor is to coordinate testing with an analytical lab, hired by the owner, licensed by the State of California for the DTSC testing. The costs associated with the testing will be paid by the contractor.
2. DTSC testing shall include documentation as to the previous land use, location, and history. Soils shall be analyzed for all compounds of concern to ensure the imported soil is uncontaminated and acceptable. Testing shall be performed per the recommendations included in DTSC Imported Fill Advisory http://www.dtsc.ca.gov/Schools/upload/SMP FS Cleanfill-Schools.pdf). Soils shall be tested prior to import to the project site.
   Lab shall determine geographically which tests and analysis comparison will be appropriate for the testing. (CAM 17 / Title 22); (RWQCB) Regional Water Quality Control Board; or (OEHHA) Office of Environmental Health Hazard Assessment.

3. Frequency of testing shall be conducted in accordance with DTSC's Imported Fill Advisory as follows;

Fill Material Sampling Schedule

Area of Individual Borrow Area	**Sampling Requirements**
2 Acres or less	Minimum of 4 samples
2 to 4 Acres	Minimum of 1 sample every ½ Acre

4 to 10 Acres	Minimum of 8 Samples
Greater than 10 Acres	Minimum of 8 locations with 4 subsamples per location

Volume of Borrow Area Stockpile

Up to 1,000 Cubic Yards	1 sample per 250 cubic yards
1,000 to 5,000 Cubic Yards	4 samples for the first 1000 cubic Yards + 1 sample per each additional 500 cubic yards
Greater than 5,000 Cubic Yards	12 samples for the first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

4. Reports/ Documentation

   a. Results of the testing analysis shall be sent to the Owner; Architect; Project Inspector, Project Civil Engineer, DTSC, and DSA. Letter shall reference DSA file and application numbers.

C. Landscape Backfill Material:

1. The top 4 inches of native topsoil stripped from the site may be used for landscape backfill material provided it meets the requirements as specified in Section 32 90 00.
2. Imported Topsoil may be required to complete work. See Section 329000 for requirements. Proposed Topsoil material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.

D. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

E. Aggregate Base: Provide Class 2, 3/4” Aggregate Base conforming to standard gradation as specified in Cal Trans Standard Specifications, Section 26,-1.02A.

F. Decomposed Granite: Decomposed Granite shall be well graded mixture of fine to 1/8” particles in size with no clods. The material shall be free of vegetation, other soils, debris and rock. The material shall be reddish-tan to tan in color.

G. Decomposed Granite Solidifier: PolyPavement or equal.

PART 3 – EXECUTION

3.01 INSPECTION LAYOUT AND PREPARATION

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point where this installation may properly commence

B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.

C. Verify that specified items may be installed in accordance with the approved design.

D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 PERFORMANCE

A. GENERAL:

1. General: Do all grading, excavating and cutting necessary to conform finish grade and contours as shown. All cuts shall be made to true surface of subgrade.
2. Archaeological Artifacts: Should any artifacts of possible historic interest be encountered during earthwork operations, halt all work in area of discovery and immediately contact the Architect for notification of appropriate authorities.
3. Degree of Compaction: Percentage of maximum density, hereinafter specified as degree of compaction required, means density equivalent to that percentage of maximum dry density determined by ASTM D1557 Compaction Test method, and such expressed percentage thereof will be minimum acceptable compaction for specified work.
4. Moisture Content: Moisture content shall be as noted below and as called for on the plans. Moisture content shall be maintained until subgrade is covered by surfacing materials.

3.03 DEMOLITION, DISPOSAL AND DISPOSITION OF UNDESIRABLE MAN-MADE FEATURES

A. All other obstructions, such as abandoned utility lines, septic tanks, concrete foundations, and the like shall be removed from site. Excavations resulting from these removal activities shall be cleaned of all loose materials, dish shaped, and widened as necessary to permit access for compaction equipment. Areas exposed by any required over-excavation should be scarified to a depth of 12 inches, moisture-conditioned to at least optimum moisture content, and recompacted to at least 90% of the maximum dry density.

3.04 TESTING AND OBSERVATION

A. All grading and earthwork operations shall be observed by the Geotechnical Engineer or his representative, serving as the representative of the Owner.

B. Field compaction tests shall be made by the Geotechnical Engineer or his representative. If moisture content and/or compaction are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified moisture or compaction. Notify Geotechnical Engineer at least 48 hours in advance of any filling operation.

C. Earthwork shall not be performed without the notification or approval of the Geotechnical Engineer or his representative. The Contractor shall notify the Geotechnical Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.

D. If the Contractor should fail to meet the compaction or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory, as determined by the Geotechnical Engineer or Architect/Engineer.

E. After each rain event Geotechnical Engineer shall test fill material for optimum moisture. Do not place any fill material until desired moisture is achieved.

3.05 CLEARING AND GRUBBING

A. Prior to grading, remove all debris off-site. Remove trees and brush including the root systems. Holes resulting from tree and brush removal should be prepared and backfilled in accordance with paragraphs 3.07, 3.08, 3.09, and 3.10. This may require deepening and/or widening the holes to adequately remove disturbed soil and provide room for compaction equipment. Strip the surface of all organics. Stripping's meeting the requirements of Landscape Top Soil may be used in landscape areas only.

3.06 CUTTING

A. Do all cutting necessary to bring finish grade to elevations shown on Drawings.

B. When excavation through roots is necessary, cut roots by hand.

C. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.

3.07 STRUCTURAL EXCAVATION

A. General: Excavate to bear on firm material at contract depth shown on Structural Drawings.

B. Footings: All footing excavations shall be of sufficient width for installation of formwork, unless earth will retain its position during concreting. All portions of footings above grade must be formed.

C. Unsuitable Ground: Any errors in structural excavation, soft ground, or clay soils found

when excavating shall be reported to Architect. In no case shall work be built on any such soft or clayey unsuitable surface without direction from the Architect. Restore excavations to proper elevation with engineered fill material compacted to 90% of dry density.

3.08 SUBGRADE PREPARATION

A. Grade compact and finish all subgrades within a tolerance of 0.10' of grades as indicated on Drawings and so as not to pool water. Subgrade within building pads and concrete walks shall be within 0.05' of grades indicated.

B. After clearing, grubbing and cutting, subsurface shall be plowed or scarified to a depth of at least 12 inches, until surface is free from ruts, hummocks or other uneven features and uniform and free from large clods. Moisture condition to at least optimum moisture content and recompact to at least 90% of the maximum dry density as determined by ASTM Test Method D1557. If the existing soils are at a water content higher than specified, the contractor shall provide multiple daily aerations by ripping, blading, and/or disking to dry the soils to a moisture content where the specified degree of compaction can be achieved. After seven consecutive working days of daily aerations, and the moisture content of the soil remains higher than specified, the contractor shall notify the architect. If the existing soils have a moisture content lower than specified, the contractor shall scarify, rip, water and blade existing soil to achieve specified moisture content. The contractor shall make proper allowance in schedule and methods to complete this work.

C. Subgrade in areas to receive landscaping shall be compacted to 90%.

D. Where Contractor over-excavates building pads through error, resulting excavation shall be recompacted as engineered fill at Contractor's expense.

3.09 PLACING, SPREADING AND COMPACTING FILL MATERIAL IN BUILDING PAD AND PAVEMENT AREAS

A. Selected fill material shall be placed in layers which, when compacted, shall not exceed 6 inches in compacted thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity in moisture content

B. Selected fill material shall be moisture-conditioned to specified moisture content. Selected fill material shall be unfrozen. When moisture content of fill material is below that specified, add water until proper moisture content is achieved. When moisture content is above that specified, aerate by blading or other methods mentioned in 3.08 B until moisture content is satisfactory.

C. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to a minimum of 90% as determined by the ASTM D1557 Compaction Test. Compact each layer over its entire area until desired density has been obtained.

D. Recompaction of Fill in Trenches and Compaction of Fill Adjacent to Walls: Where trenches must be excavated, backfill with material excavated. Place in lifts that when compacted do

not exceed 6 inches, moisture conditioned to at least optimum moisture content, and compact to a minimum of 90% relative compaction in building pad and paved areas, and to 90% relative compaction in landscape areas.

E. Jetting of fill materials will not be allowed.

3.10 FINAL SUBGRADE COMPACTION

A. Building Pads: Upper 12 inches of all final building pad subgrades (including future buildings) shall be uniformly compacted at specified moisture content to at least 90% of maximum dry density, as determined by ASTM D1557 Compaction Test, regardless of whether final subgrade elevation is attained by filling, excavation, or is left at existing grade. After acceptance of final compaction test, contractor shall maintain the required moisture content of subgrade until concrete flatwork is placed.

B. Paved Areas: Upper 12 inches of all final subgrades supporting pavement sections and all other flatwork shall be brought to specified moisture content and shall be uniformly compacted to not less than 90% of maximum dry density, regardless of whether final subgrade elevation is attained by filling, excavation, or is left at existing grade. After acceptance of final compaction test, contractor shall maintain the required moisture content of subgrade until concrete flatwork is placed.

C. Other Fill and Backfill: Upper 6 inches of all other final subgrades or finish grades shall be compacted to 85% of maximum dry density.

D. Gravel Fill: Do not place compacted gravel fill until after underground work and foundations are in place. Compact gravel fill with vibratory plate or similar equipment to preclude settlement.

3.11 PLACING, SPREADING, AND COMPACTION OF LANDSCAPE BACKFILL MATERIALS

A. All landscaped areas shall receive topsoil. After subgrade under landscape area has been scarified and brought to 85% maximum dry density, top soil shall be placed evenly to depth of 6 inches at 85% of maximum dry density.

B. Project Inspector must verify that materials are uniformly spread to minimum depth specified.

3.12 DECOMPOSED GRANITE COMPACTION AND STABILIZATION

A. Decomposed granite paving, paths or track shall be placed uniformly to the required depth and treated with PolyPavement or approved equal. Apply PolyPavement using Application Method 1 or a mixed application method.

3.13 SLOPE CONSTRUCTION

A. Cut slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Fill slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Prior to placement of fill on an existing slope the existing slope shall be benched. The benches shall be in a ratio of 4 horizontal to 1 vertical. The face of the fill slopes shall be compacted as the fill is placed, or the slope may be overbuilt and then cut back to the design grade. Compaction by track walking will not be allowed.

3.14 FINISH GRADING

A. At completion of project, site shall be finished graded, as indicated on Drawings. Finish grades shall be “flat graded” to grades shown on the drawing. Mounding of finish grades will not be allowed unless otherwise directed on the landscape drawings. Tolerances for finish grades in drainage swales shall be +-0.05’. Tie in new and existing finish grades. Leave all landscaped areas in finish condition for lawn seeding. Landscaped planters shall be graded uniformly from edge of planter to inlets. If sod is used for turf areas the finish grade on which it is placed shall be lowered to allow for sod thickness.

B. All landscape areas shall be left free of rock or foreign material.

C. All landscape areas shall be approved by Architect prior to any planting.

3.15 SURPLUS MATERIAL

A. Excavated material not required for grading or backfill shall be removed from site at contractor’s expense.

3.16 CLEANING

A. Remove from fill all vegetation, wood, form lumber, casual lumber, and shavings, in contact with ground; buried wood will not be permitted in any fill.

END OF SECTION

TREE PROTECTION

Section 31 13 16
21-32-051

PART 1 - GENERAL

1.01 DESCRIPTION

Provide tree protection complete as shown and as specified.

1.02 RELATED SECTIONS

A. SITE DEMOLITION

B. IRRIGATION: Section 32 80 00.

C. LANDSCAPING: Section 32 90 00.

1.03 GUARANTEE

Guarantee all workmanship and materials hereunder against defective workmanship and materials, including damage by leaks and settlement of irrigation trenches, for the duration specified in Division 01 of these Specifications. (The Contractor is not responsible for vandalism or theft after date of final acceptance.)

1.04 SUBMITTALS AND SUBSTITUTIONS

A. Contractor shall submit Fenced Tree Protection Area plan to Architect outlining all trees and plants listed by number to be protected and their groupings. All trees and plants shall be grouped in their own Fenced Tree Protection Areas as shown in Drawings.

B. Contractor shall submit to Landscape Architect in writing a schedule including any and all activity inside Fenced Tree Protection Areas. This schedule to include but not limited to the dates fences are initially installed, altered and dates of fence replacement. Intent of these provisions is that the Tree Protection Zone (TPZ) are fenced for the entire duration with only exceptions of short intervals or specifically defined construction activity needs. Revise schedule as directed by Architect.

C. Provide a Mediation Plan to keep existing trees and planting irrigated during construction.

PART 2 - PRODUCTS

2.01 GENERAL

Use materials as specified; any deviation from the Specifications must first be approved by the Owner’s Representative in writing. All material containers or certificates shall be clearly marked by manufacturer as to contents for inspection.

2.02 MATERIALS

A. Trunk Protection constructed of:

1. 20-foot long 2x6 wood boards or length needed to protect the trunk if tree trunk is shorter than 20'.

2. Metal wire. Gauge strong enough to tie the boards around the trunk of the tree.

B. Tree Protection Zone Fencing:

1. 6-foot-tall metal chain link construction fencing.

C. Bark Mulch: Untreated, shredded cedar.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS FOR TREES AND PLANTS TO BE RETAINED

A. Maintain pre-existing moisture levels.

B. Maintain areas inside the fenced tree protection area including lawn mowing, leaf removal, operation and repair of irrigation.

C. Protect root systems from flooding, erosion, excessive watering and drying resulting from dewatering or other operations:

D. Prohibitions - DO NOT:

1. Allow run off or spillage of damaging materials in vicinity of root systems,

2. Rinse tools or equipment under trees,

3. Store materials, stockpile soil, park or drive vehicles within drip lines or in areas with plants,

4. Cut, break skin or bark, bruise roots or branches,

5. Allow fires under and adjacent trees and plants,

6. Discharge exhaust under foliage,

7. Secure cable, chain or rope to trees,

8. Change grade within drip line of trees without Landscape Architect's approval,

9. Lime shall not be used.

3.02 TREE TRUNK PROTECTION

A. Conform to requirements for trees and plants to be retained, per 3.01, above.

B. Install boards vertically around tree and bind together with wire to protect the bark 360 degrees around the entire tree prior to start of any demolition and construction. Boards are not to dig into bark.

C. Major scaffold limbs may require plastic fencing to be wrapped around them to protect them.

3.03 TREE DRIPLINE PROTECTION

A. The Tree Protection Zone (TPZ) is a restricted area around the base of the tree with a radius of one foot (1') for every inch of tree trunk diameter or ten feet, which is greater, enclosed by 48" tall snow fencing.

B. Signage designating the protection zone and penalties for violations shall be secured in prominent location on each protection fence.

3.04 REQUIREMENTS FOR TREES TO BE PROTECTED

A. Duration: Tree protection shall be erected before demolition, grading, or any construction begins and remain in place until final inspection of the project.

B. Conform to requirements for trees and plants to be retained, per 3.01, above.

C. Architect shall give final review of Tree Protection before construction to begin. Revise schedule as directed by Architect.

D. Vehicle movement within the TPZ will only be allowed for construction equipment.

1. Within dripline, apply 10-inch layer of mulch over geotextile fabric.

E. Perform trenching operations within the TPZ of the tree so that:

1. Digging shall be by hand using narrow trenching shovel,

2. No roots larger than 2" diameter are cut and utilities are routed around or below them,

3. Roots smaller than 2" diameter are cut with sharp tools, saws, loppers- not torn, chopped or broken.

F. Where roots are exposed:

1. Do not allow the roots to dry out,

2. On the same day the excavation is made, provide temporary backfill to original grade at tree roots,

3. Or cover roots with 4 layers of wet untreated burlap, made wet each day, including weekends.

G. Roots larger than 3" in diameter are not to be cut without review and approval of Arborist.

3.05 REPAIR AND REPLACEMENT OF TREE:

A. It shall be the responsibility of Contractor to repair or replace any damaged trees.

B. Repair trees damaged by operations:

1. within 24 hours of damage,

2. to satisfaction of Landscape Architect,

3. to ISA Pruning Standards.

C. Replace repaired trees where repair has not restored them to health or aesthetics:

1. within 6 months of request to replace,

2. to the satisfaction of Landscape Architect,

3. with replacement plants of a size and variety matching those that were removed,

D. Replaced trees and plants shall be the responsibility of Contractor to maintain in good health and aesthetics for the duration of the project from installation.

1. Contractor shall submit to Landscape Architect comprehensive maintenance plan for replacement tree, including but not limited to provisions for irrigation system independent of existing system.

E. Where suitable replacement of trees and plants are not available:

1. Contractor shall provide affidavits to Landscape Architect that they are not available.

2. Contractor shall provide compensation to the State at the following rates:

a. $2000 for each caliper inch of any tree or plants removed under 12 inches.

b. $4000 for each caliper inch of any tree or plants removed 12 inches or more.

c. Caliper of trees and plants measured at 6 inches above grade.

d. Caliper defined here as thickness of diameter, measured in inches.

3.06 SOIL CONTAMINATION:

Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.

END OF SECTION

TRENCHING AND BACKFILLING

Section 31 23 33
21-32-051

PART 1 – GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The general conditions, supplementary conditions and Division 1 are fully applicable to this section as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 00 00, Earthwork.

C. Section 33 40 00, Site Drainage.

D. Section 33 00 00, Site Utilities.

E. Section 32 12 00, Asphalt Concrete Paving

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. Contractor / Installer shall have been in business for five (5) years providing/finishing similar size projects and complexity.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Submit Manufacturers data and shop drawings.

1.05 WARRANTY

A. Submit fully executed warranty for work and materials in this section per 01 78 36.

1.06 REFERENCES AND STANDARDS

A. California Building Code current edition.

B. California Plumbing Code current edition.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Contractor shall acquaint himself with all existing site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Field verify that all components, backing, etc. by others are installed correctly to proceed with installation of products as herein specified.

C. Trench dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for trench dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.09 PROTECTION

A. Adequate protection measures shall be provided to protect workers and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations. Repair all trenches in grass areas with new sod (seeding not permitted) and "stake-off" for protection.

B. Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Architect or Owner is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. Keep all excavations free from water during entire progress of work, regardless of cause, source or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance.

H. Trees: Carefully protect existing trees which are to remain.

1.10 TRENCH SAFETY PROVISIONS

A. General Contractor shall be solely responsible for safety design, construction and coordination with agencies having jurisdiction. If such plan varies from shoring system standards established by Construction Safety Orders, plan shall be prepared by registered civil or structural engineer.

B. Nothing herein shall be deemed to allow use of shoring, sloping or protective system less effective than that required by Construction Safety Orders of California State Division of Industrial Safety.

C. When trenching through paved surface, provide steel trench plates to cover open trenches daily until trenches are backfilled.

1.11 SEASONAL LIMITS

A. No backfill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, full operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Material above optimum moisture shall be processed per section 31 00 00, 3.08, B.

1.12 TESTING

A. General: Refer to Section 01 45 00 – Quality Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Backfill materials: Pipeline and conduit trench backfill as shown on the plans and as specified below.

1. ¾ inch crush rock.
2. Native Materials: Soil native to Project Site, free of wood, organics, and other deleterious substances. Rocks shall not be greater than __-inches.
3. Sand: Fine granular material, free of organic matter, mica, loam or clay.
4. Lean Mix Concrete/Controlled Density Backfill: 2 sacks cement slurry.
5. Class 2 aggregate base, ¾” rock, per Caltrans section 26-1.02B

B. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

PART 3 – EXECUTION

3.01 INSPECTION

A. Verification of Conditions:

1. Examine areas and conditions under which work is to be performed.
2. Identify conditions detrimental to proper or timely completion of work and coordinate with General Contractor to rectify.

3.02 COORDINATION

A. General Contractor shall coordinate work as herein specified, in accordance with drawings and as required to complete scope of work with all related trades.

3.03 INSTALLATION

A. Perform work in accordance with pipe manufacturer's recommendations, as herein specified and in accordance with drawings.

3.04 TRENCHING

A. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of trench around installed item as required for caulking, joining, backfilling and compacting; not less than 12 inches wider than pipe or conduit diameter, unless otherwise noted.

B. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.

C. Trench straight and true to line and grade with bottom smooth and free of edges or rock points.

D. Where depths are not shown on the plans, trench to sufficient depth to give minimum fill above top of installed item measured from finish grade above the utility as follows:

1.	Sewer pipe:	depth to vary
2.	Storm drain pipe:	depth to vary
3.	Water pipe - Fire Supply:	36 inches
4.	Water pipe – Domestic Supply:	30 inches

E. Where trench through existing pavement saw cut existing pavement in straight lines. Grind existing asphalt on each side of trench 3" wide x ½ the depth of the section. Apply

tact coat to vertical surfaces before installing new asphalt. Replace asphalt and concrete pavement sections to matched existing conditions. In concrete pavement provide expansion and control joints to match existing joint layout.

3.05 BACKFILL

A. Pipe Trench Backfill is divided into three zones:

1. Bedding: Layer of material directly under the pipe upon which the pipe is laid.
2. Pipe Zone: Backfill from the top of the bedding to 6 inches (compacted) over the top of the pipe.
3. Upper Zone: Backfill between top of Pipe Zone and to surface of subgrade.

B. Bedding: Type of material and degree of compaction for bedding backfill shall be as defined in the Details and Specifications.

C. Pipe Zone and Upper Zone Backfill:

1. Type of material and degree of compaction Pipe Zone and Upper Zone Backfill shall be as required by Drawings, Details, & Specifications.
2. Upper Zone Backfill shall not be placed until conformance of Bedding and Pipe Zone Backfill with specified compaction test requirements has been confirmed.
3. Backfill shall be brought up at substantially the same rate on both sides of the pipe and care shall be taken so that the pipe is not floated or displaced. Material shall not be dropped directly on pipe.

D. Backfill Compaction:

1. Backfill shall be placed in layers which, when compacted shall not exceed 6 inches in thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity. Do not backfill over, wet, frozen or soft subgrade surfaces. Employ a placement method that does not disturb or damage foundation walls, perimeter drainage, foundation damp-proofing, waterproofing or protective cover.
2. When moisture content of fill material is below that required to achieve specified density, add water until proper moisture content is achieved. When moisture content is above that required, aerate by blading or other methods until specified moisture content is met, see section 310000, 3.08, B.
3. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to 90% of maximum dry density while at specified moisture content. Compact each layer over its entire area until desired density has been obtained.
4. The top 12 inches of subgrade compaction under pavement or building shall be per Earthwork section 31 00 00.
5. Compaction: All backfill operations shall be observed by the Inspector of Record and/or Geotechnical Engineer. Field density tests shall be made to check compaction of fill material. If densities are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain

specified densities. Notify Inspector and Architect at least 24 hours in advance of any operation.

3.06 TRENCH AND SITE RESTORATION

A. Finished surface of trenches shall be restored to a condition equal to, or better than the condition as existed prior to excavation work.

3.07 PROTECTION

A. Protect existing surfaces, structures, and utilities from damage. Protect work by others from damage. In the event of damage, immediately repair or replace to satisfaction of Owner.

B. Repair existing landscaped areas to as new condition. Replant trees, shrubs or groundcover with existing materials if not damaged or with new materials if required. Replace damaged lawn areas with sod, no seeding will be permitted.

C. Replace damaged pavement with new compatible matching materials. Concrete walks to be removed to nearest expansion joint and entire panel replaced. Asphalt to be cute neatly and replaced with new materials.

D. Any existing materials removed or damaged due to trenching to be returned to new condition.

3.08 SURPLUS MATERIAL

A. Remove excess excavated material, unused materials, damaged or unsuitable materials from site.

3.09 CLEANING

A. Refer to Section 01 74 00.

B. Contractor will keep the work areas in a clean and safe condition so his rubbish, waste, and debris do not interfere with the work of others throughout the project and at the completion of work.

C. After completion of work in this section, remove all equipment, materials, and debris. Leave entire area in a neat, clean, acceptable condition.

END OF SECTION

ASPHALT CONCRETE PAVING

Section 32 12 00
21-32-051

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 00 00, Earthwork.

C. Section 31 23 33, Trenching and Backfilling.

D. Section 33 40 00, Site Drainage.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall provide verification that asphalt mix temperature meets the requirements of this specification at time of application.

E. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

F. Sieve analysis from testing laboratories identifying rock/sand percentages within the asphalt mix shall have a testing date within 90 days of contract signing.

G. Sieve analysis from a testing laboratory identifying rock/sand percentages within the class 2 aggregate base rock shall have a testing date within 90 days of contract signing.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.05 WARRANTY

A. Refer to General Conditions and Section 01 78 36.

1.06 REFERENCES AND STANDARDS

A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

E. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

F. CALTRANS Standard Specifications.

G. CAL-OSHA, Title 8, Section 1590 (e).

H. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Environmental Requirements:

1. Base Course: Do not lay base course on muddy subgrade, during wet weather, or when atmospheric temperature is below 40 degrees F.
2. Asphalt Surfacing: Do not apply asphaltic surfacing on wet base, during wet weather, or when atmospheric temperature is below 50 degrees F.

1.09 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the owner’s representative is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

E. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

F. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

1.11 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.12 TESTING

A. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sterilant: Soil sterilizer shall be CIBA GEIGY's Pramatol 25-E or Thompson-Hayward Casoron.

1. Soil sterilizer shall be applied in strict accordance with manufacturer's instructions.

B. Base Course Aggregate: State Specifications, Section 26, Class 2 aggregate base (3/4" max.).

C. Asphalt Binder: Steam-refined paving asphalt conforming to State Specifications, Section 92, viscosity grade PG 64-10. Asphalt binder additives for WMA per Caltrans approved list of manufacturer's.

D. Liquid Asphalt Tack Coat: Per CALTRANS section 94.

E. Surface Course Aggregate: Mineral aggregates for Type "B" asphalt concrete, conforming to State Specifications 39-2.02, Type B, ½" maximum, medium gradation. 3/8" maximum gradation at Playcourt.

F. Seal Coat: shall be a pre-mixed asphalt emulsion blended with select fillers and fibers such as:

1. "Park-Top No. 302", Western Colloid Products.
2. "OverKote", Reed and Gram.
3. "Drivewalk", Conoco Oil.

G. Wood Headers and Stakes: Pressure treated.

H. Pavement Marking: Colors as directed by Architect. Colors of painted traffic stripes and pavement markings must comply with ASTM D 6628.

1. Waterborne traffic line - colors white, yellow and red, State specification PTWB-01R3.
2. Waterborne traffic line for the international symbol of accessibility and other curb markings – blue, red and green, Federal specification TT-P-1952F.

I. Precast Concrete Bumpers: 3000 psi at 28 day minimum strength; 48" length unless otherwise indicated; provide with steel dowel anchors and concrete epoxy.

J. Pavement Epoxy; K-Lite; Ktepx-590; Ennis Epoxy HPS2 or an approved equal.

K. Crack Filler;

1. Cracks up to ½": QPR model CAR08, 10oz asphalt crack filler; Star STA-FLEX Trowel Grade crack filler or approved equal.
2. Cracks ¼" – 1": "Docal 1100 Viscolastic, distributed by Conoco, Inc., Elk Grove, CA, (916) 685-9253, or approved equal.
3. Cracks greater than 1": Hot Mix, Topeka.

L. Reclaimed Asphalt Paugment (RAP). HMA Type A or Type B may be produced using RAP providing it does not exceed 15% of the aggregate blend.

2.02 MIXES

A. General: Plant mixed conforming to State Specifications, Section 39, Type B, ½" maximum, medium grading. 3/8" maximum grading shall be used at hardcourt.

B. Temperature of Hot Mix Asphalt: Not less than 275 degrees F nor more than 325 degrees F when added to aggregate.

C. Temperature of Hot Mix Aggregate: Not less than 250 degrees F nor more than 325 degrees F when asphalt is added.

D. Temperature of Hot Mix Asphalt Concrete: Asphalt shall be not less than 285 degrees at time of application, nor more than 350 degrees. Asphalt not meeting the required temperature shall not be used.

E. Temperature of Warm Mix Asphalt: Mixing and placement; Per the approved manufactures heat range recommendations for mixing and placement.

PART 3 - EXECUTION

3.01 EXAMINATION OF CONDITIONS

A. Conditions of Work in Place: Subsurfaces which are to receive materials specified under this Section shall be carefully examined before beginning work hereunder, and any defects therein shall be reported, in writing, to the Architect. Work shall not be started until such defects have been corrected. Starting of work shall imply acceptance of conditions as they exist.

3.02 PREPARATION

A. Sub-Grade: Clean, shape and compact to hard surface free from elevations or depressions exceeding 0.05' in 10' from true plan. Compact per Section 310000. Compaction and moisture content shall be verified immediately prior to placement of aggregate base. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

B. Cleaning: Existing surfaces and new surface shall be clean of all dirt, sand, oil or grease. All cracks shall be cleaned and free of all debris and vegetation. Hose down entire area with

a strong jet of water to remove all debris.

3.03 INSTALLATION

A. Headers:

1. General: Install as edging to asphalt paving, except where adjoining existing pavement, concrete curbs, walks or building.
2. Existing Headers: Remove existing headers where new paving will join existing. Saw cut existing asphalt to provide clean edge.
3. Lines and Levels: Install true to line and grade. Cut off tops of stakes 2-inches below top of header so they will not be visible on completion of job.

B. Asphalt Paving:

1. Base Course: Install in accord with State Specifications, Section 26. Compact to relative compaction of not less than 95%, ASTM D1557. The material shall be deposited on the subgrade in such a manner as to provide a uniform section of material within five percent tolerance of the predetermined required depth. Deposition will be by spreader box or bottom dump truck to prevent segregation of the material. The material so deposited on the subgrade shall have sufficient moisture which, in the opinion of the Architect is adequate to prevent excessive segregation. It shall then be immediately spread to its planned grade and cross section. Undue segregation of material, excessive drifting or spotting of material will not be permitted. If in the opinion of the site geotechnical engineer, the material is unsuitably segregated, it shall be removed or completely reworked to provide the desired uniformity of the material.

    a. Moisture content and compaction of base material shall be tested immediately prior to placement of asphalt paving.

2. Sterilant: Apply specified material at manufacturer's recommended rate. Applicator of sterilant material shall be responsible for determining location of all planter areas. Apply specified material over entire base course area just prior to application of asphalt. Follow manufacturer's printed directions.
3. Liquid Asphalt Tack Coat: Apply as "tack coat" to all vertical surfaces of existing paving, curbs, walks, and construction joints in surfacing against which paving is to be placed.
4. Asphalt Concrete Surface Course:

    a. Comply with State Specifications, 39-6 except as modified below.

        1) Final gradation shall be smooth, uniform and free of ruts, humps, depressions or irregularities, with a minimum density of 91% of the theoretical maximum specific gravity determined by California Test Method #309. Maximum variation 1/8 inch in 10' when measured with steel straightedge in any one direction. Test paved areas for

proper drainage by applying water to cover area. Correct portions that do not drain properly by patching with plant mix. In no case shall accessible parking spaces or loading and unloading areas exceed 2% slope in any direction.

2) Asphalt material shall be delivered to the project site in a covered condition to maintain acceptable temperature. Onsite inspector shall verify temperature of asphalt upon truck arrival to the site.

5. Placement and adjustment of Frames, Covers, Boxes and Grates: The Contractor shall set and adjust to finish grade all proposed and existing frames, covers, boxes, and grates of all manholes, drop inlets, drain boxes, valves, cleanouts, electrical boxes and other appurtenant structures prior to placement of asphaltic concrete.
6. Water Testing: All paved areas shall be water tested, to check drainage, in the presence of the project inspector prior to placement of seal coat. The surface of asphalt paving shall not vary more than 1/8 inch above or below the grade established on the plans. If variations in grade are present, they will be corrected by overlaying paving and/or pavement removal and replacement as directed by the Architect.
7. Patching: Cut existing paving square and plumb at all edges to be joined by new paving. In trenches; grind existing asphalt on each side of trench 3" wide x ½ the depth of the section. Apply tact coat to vertical surfaces before installing new work. Warp carefully to flush surface, with seal over joints, and feather edge. Sawcut, remove and patch existing paving where cutting is necessary for installation of piping or conduits under Divisions 2, 15 and 16.

C. Seal Coat:

1. Seal coat shall be applied no sooner than 30 days from time of asphalt placement, no exceptions.
2. Surface Preparation: surface and cracks shall be clean of all dirt, sand, oil or grease. All cracks shall be filled to a level condition after curing. Make multiple fill applications until a level condition is achieved. Failure to do so will be the reason for rejection. Hose down entire area with a strong jet of water to remove all debris. Remove soft, loose, or otherwise damaged areas of asphalt concrete to full depth of damage and replace with compacted hot mix asphalt concrete as specified herein. Minor holes and imperfections may be patched using hot mix asphalt or mastic using sand/SS-1-H. Use wire brush for removal of oil and grease; prime with shellac or synthetic resin as recommended by manufacturer of pavement sealer material.
3. Seal Coat Seal Application: Thoroughly mix materials and apply in the presence of the onsite inspector. Failure to do so will be cause for rejection. Apply in accordance with manufacturer's written instructions.

    a. The minimum application rate for each applied coat shall be 30gals per 1000 sq. ft. Two coats of sealcoat will be required.
    b. Clean-Up and Precautions: As recommended by pavement sealer material manufacturer.

D. Asphalt Concrete Overlay Paving:

1. Comply with State Specifications, 39-6 except as modified below.
2. Grind or remove existing asphalt concrete paving at limits of overlay paving to provide a minimum 1 1/2" overlay thickness. Limits of grinding or removal shall be field verified to insure that finished paving surface will have a one percent minimum slope.
3. Thoroughly clean surface to remove vegetation, dirt, sand, gravel and water from surface and from cracks. Vegetation shall be treated 7 days prior to removal with an herbicide.
4. Cracks greater than 1 inch shall be filled with hot mix asphalt and rolled and compacted. Cracks less than one inch shall be filled with crack filler. Potholes shall be filled with hot-mix rolled and compacted. Contractor shall have Engineer approve crack and pothole repair prior to overlay. Provide leveling courses of hot mix asphalt as required to achieve finish grades shown on the drawings.

    a. Cracks less than one inch in width shall be level after curing. Contractor shall make multiple filling applications as necessary to achieve a level condition.

5. Place overlay when ambient air temperature is 40 degrees F. and rising, and when pavement is dry.
6. An asphalt tack coat shall be applied to existing surface area at a rate of 0.20 gallons per square yard. Application width shall be width of fabric plus 2 to 6 inches.
7. Place, spread and compact asphalt overlay to provide a minimum density of 95% of maximum theoretical unit weight as determined by California Test Method #304. Maximum variation 1/8" in 10' when measured with steel straight edge in any one direction. Test paved areas for proper drainage by applying water to cover area. Correct portions that do not drain properly by patching with plant mix. Minimum compacted overlay thickness 1 1/2 inches.

E. Pavement Marking: pavement markings shall be done only after the seal coat has thoroughly dried. Existing surfaces to be striped with traffic paint shall be cleaned of dust, dirt, grime, oil, rust or other contaminants which will impair the quality of work or interfere with proper bond of paint coats. Surfaces shall be thoroughly cleaned by whatever means necessary that will satisfactorily accomplish the purpose without damage to asphalt concrete. Provide measured layouts, temporary markings, templates, and other means necessary to provide required marking. Prepare and apply paint in accordance with manufacturer's instructions; paint shall be applied by spray and shall achieve complete coverage free from voids and thin spots. Where indicated on the Drawings, paint parking stall strips, lettering, arrows, accessible symbols, playfield markings, etc. on asphalt concrete paving. Paint strips shall be 4 inches wide (except otherwise indicated) and applied with two (2) coats of herein specified Traffic Line Paint; white (except as otherwise specified or indicated).

1. Paints shall be delivered to the site in unopened containers.

    a. Paint shall not be diluted, or watered down.

b. Paint shall be applied in 10-12 wet mil thickness (4-6 mil dried). Each coat thickness shall be verified by the project inspector.

2. International Accessible Symbol: Symbol shall be white figures on a blue background. Blue shall be equal to PMS 293C. Lines and symbols shall be accurately formed and true to line and form; lines shall be straight and uniform in width. Painted edges shall be clean cut and free from raggedness, and corners shall be cut sharp and square. Tolerances: Apply striping within a tolerance 1/2 inch in 50 feet. Apply markings and striping to widths indicated with a tolerance of 1/4 inch on straight sections and 1/2 inch on curved sections.

F. Colors: As directed by Architect

G. Precast Concrete Bumpers: Install in location where shown, using steel rebar dowels, and epoxy.

3.04 DEFECTIVE ASPHALT;

Defective asphalt is as described below.

A. Exposed rock pockets on the finished surface that lack the # 8- #200 fines that is required per the sieve analysis.

B. Asphalt not placed to the design grades.

C. Asphalt that ponds water.

D. Asphalt that was compacted below the minimum required temperature and is cracked.

E. Asphalt that fails to meet the minimum compaction requirements.

F. Asphalt that lacks the minimum thickness required per plan.

G. New asphalt contaminated by a petroleum product, or spilled paint.

H. Asphalt that has depressions, cracks, scored divits from dumpster wheels, heavy equipment use, heavy construction products,

I. Asphalt placed on pumping, unstable sub-grades.

3.05 CLEANING

A. Refer to Section 01 74 00.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

C. Clean excess material from surface of all concrete walks and utility structures.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Section describes the requirements for providing portland cement concrete paving, including accessibility ramps, sidewalks, accessible routes of travel, vehicular travel, drain structures, sewer structures, thrust blocks and for other non-structural or non-vehicular applications.

1.02 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 45 00, Testing Lab Services.

B. Section 31 00 00, Earthwork.

1.04 QUALITY ASSURANCE

A. Use only new materials and products.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Sieve analysis from testing laboratories identifying rock/sand percentages within the concrete mix; or class 2 aggregate base shall have the current project name and project location identified on the report. Outdated analytical reports greater than 90 days old will not be accepted

1.05 SUBMITTALS

A. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

B. Materials list: Submit to the Architect a complete list of all materials proposed to be used in this portion of the work. Submitted items should include but are not limited to sand, gravel, admixtures, surface treatments, coloring agents, sealers, fibers, cast-in-place accessories, forming and curing products and concrete mix designs.

C. With concrete submittal, provide documented history of mix design performance.

1.06 WARRANTY

A. Refer to General Conditions.

1.07 REFERENCES AND STANDARDS

A. California Building Code, 2019 edition.

B. ACI Standards, ACI 211.1, ACI 318-14, ACI 302, IR-04, ACI 301-16, ACI 305R-10, ACI 306R-16, ACI 308-16.

C. ASTM C-94, Specification for Ready-Mixed Concrete.

D. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice (latest edition).

E. ASTM – American Society for Testing and Materials.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

E. Store cement in weather tight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.

F. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregate. Use only one supply source for each aggregate stock pile.

1.09 ADEQUACY AND INSPECTION

A. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.

B. Notify Inspector, Architect and DSA at least 48 hours prior to placing of concrete.

1.10 PROTECTION

A. Finish surfaces shall be protected at all times from concrete pour. Inspect forming against such work and establish tight leak-proof seal before concrete is poured. Finish work damaged, defaced or vandalized during the course of construction shall be replaced by contractor at contractor expense.

1.11 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting, slopes and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: Portland cement, ASTM C150, Type II, per ACI 318-14 Section 26.4.

B. Concrete Aggregates: Normal weight aggregates shall conform to ASTM C33, except as modified by this section. Combined grading shall meet limits of ASTM C33. Lightweight aggregate shall conform to ASTM C330, suitably processed, washed and screened, and shall consist of durable particles without adherent coatings.

C. Water: Clean and free from deleterious amounts of acids, alkalis, scale, or organic materials and per ACI 318-14 Section 26.4.1.3.1.

D. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted). Not more than 15% (by mass) may be substituted for portland cement.

E. Water Reducing Admixture: Admixture to improve placing, reduce water cement ratio, and ultimate shrinkage may be used. Provide WRDA 64 by Grace Construction Products or approved equal. Admixture shall conform to ASTM C494 and ACI 318-14 Section 26.4.1.4.19(a). Such admixture must receive prior approval by the Architect, Structural Engineer, and the Testing Lab, and shall be included in original design mix.

F. Air-entraining Admixture: Daravair 1000 by Grace Construction Products or approved equal. Admixture must conform to ASTM C260 and ACI 318-14, section 26.4.1.4.

G. Surface Retarder (for exposed aggregate finishes): Rugasol-S by Sika Corporation or approved equal.

H. Form Coating: Material which will leave no residue on concrete surface that will interfere with surface coating, as approved by the Architect.

I. Reinforcement Bars: New billet steel deformed bars conforming to requirements of ASTM A615 or ASTM A706; Grade 60. Dowels for installation through expansion joints or construction joints to existing sidewalks or concrete features shall be smooth or shall be sleeved on one end for slippage.

J. Reinforcing supports: Concrete supports with wire ties. Concrete supports without wire ties will not be allowed.

K. Truncated Domes: Vitrified Polymer Composite (VPC), Cast-In-Place Detectable/Tactile Warning Surface Tiles; “Armor-Tile”, “Access Tile Tactile Systems”, or approved equal. Tiles shall comply with Americans with Disabilities Act and the California Code of

Regulations (CCR) Title 24, Part 2, Chapter 11B (dome spacing shall be 2.35”). Install tiles as recommended by manufacturer. Color, federal yellow (FS 33538).

L. Curing Compound (for exterior slabs only): Burke Aqua Resin Cure by Burke by Edoco, 1100 Clear by W.R. Meadows or accepted equal. Water based membrane-forming concrete curing compound meeting ASTM C 309 and C1315.

M. Concrete Bonding Agent: Weld-Crete by Larson Products Corp., Daraweld C by Grace Construction Products or accepted equal.

N. Patching Mortar: Meadow-Crete GPS, one-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for horizontal, vertical and overhead applications as manufactured by W.R. Meadows or accepted equal.

O. Non-shrink Grout: Masterflow 713 Plus by Master Builders or approved equal. Premixed,non-metallic, no chlorides, non-staining and non-shrinking per CRD-C621, Corps of Engineers Specification and ASTM C 1107, Grades B and C.

P. Aggregate Base: Class 2 AB per Caltrans specification section 26-1.02A.

Q. Expansion Joint Material: Preformed 3/8" fiber material, full depth of concrete section, with bituminous binder manufactured for use as concrete expansion joint material, as accepted by the Architect.

R. Joint sealant for expansion joints: Single component silicone sealant, Type S, ASTM D5893.

1. Reference Standard: ASTM C920, Grade P, Class 25, Use T.
2. Dow Corning 890-SL (self-leveling) Silicone, or accepted equal.
3. Dow Corning 888-NS (non-sagging) Silicone, at slopes exceeding 5%. May not be used at asphalt surfaces.
4. Color: Custom color as selected by Architect.

S. Pre- Formed plastic Expansion Joint; W.R. Meadows 3/8” “Snap Cap”, Tex-Trude expansion joint cap, or an approved equal.

T. Adhesive Anchoring (Epoxy): Hilty HIT-HY 200 Safe Set, or approved equal.

2.02 CONCRETE DESIGN AND CLASS

A. Class “B”: Concrete shall have 1" max. size aggregate, shall have 3000 psi min. at 28 day strength with a maximum water to cementitious ratio no greater than 0.50. Use for exterior slabs, including walks, vehicular paved surfaces, manhole bases, poured-in-place drop inlets, curbs, valley gutters, curb & gutter and other concrete of like nature.

B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143 with a slumps of 4" plus or minus 1".

C. Mix Design: All concrete used in this work will be designed for strength in accordance with provisions of ASI 318-14 Section 26.4. Should the Contractor desire to pump concrete, a modified mix design will need to be submitted for review. Fly ash may be used in concrete

to improve workability in amounts up to 15% of the total cementitious weight.

D. Air Entrainment; Per the Local Jurisdiction minimum requirements, or 3% minimum.

2.03 MIXING OF CONCRETE

A. Conform to requirements of CBC, Chapter 19A.

B. All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogenous; mixer must be discharged completely before the mixer is recharged.

C. Concrete shall be Ready-mixed Concrete:

1. Placement of concrete shall occur as rapidly as possible after batching and in a manner which will assure that the required quality of the concrete is maintained. In no case may concrete be placed more than 90 minutes from batch time.
2. Water may be added to the mix only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. In no case shall more than 10 gallons of water shall be added to a full 9 yard load, or 1 gal. per yard on remaining concrete within the drum providing load tag indicates at time of mixing at plant will allow for additional water.

2.04 MATERIALS TESTING

A. Testing of concrete shall be performed per article 3.12 of this specification.

2.05 EQUIPMENT

A. Handling and mixing of concrete: Project Inspector may order removal of any equipment which in his opinion is insufficient or in any way unsuitable.

PART 3 - EXECUTION

3.01 APPROVAL OF FORMS AND REINFORCEMENTS

A. Forms and reinforcements are subject to approval by the Project Inspector, and notice of readiness to place first pour shall be given to project inspector and 48 hours prior to placement of concrete. Before placing concrete, clean tools, equipment and remove all debris from areas to receive concrete. Clean all reinforcing and other embedded items off all coatings oil, and mud that may impair bond with concrete.

B. All reinforcing steel shall be adequately supported by approved devices on centers close enough to prevent any sagging.

C. All reinforcing bar lap splices shall be staggered a minimum of 5 ft.

D. Additional reinforcing steel shall be placed around all utility boxes, valve boxes, manhole

frames and covers that are located within the concrete placements.

1. The bars shall be placed so that there will be a minimum of 1 ½" clearance and a maximum of 3" clearance. The reinforcing steel shall be placed mid-depth of concrete slab.

E. At all right angles or intersections of concrete walks, additional 2'x2' #5, 90 degree bars shall be added at all inside corners for additional crack control. The bars shall be placed 2" from concrete forms and supports at mid-depth of slab.

3.02 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

C. Sub-Grade in vehicular concrete paved areas: Subgrade shall be clean, shaped and compact to hard surface free from elevations or depressions exceeding 0.05' in 10' from true plan. Compact per Section 31 00 00. Compaction and moisture content shall be verified immediately prior to placement of concrete. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

3.03 CLEANING

A. Reinforcement and all other embedded items at time of placing concrete to be free of rust, dirt oil or any other coatings that would impair bond to concrete.

B. Remove all wood chips, sawdust, dirt, loose concrete and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove all standing water from excavations.

3.04 FORMING

A. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which have warped or delaminated, or require more than minor patching of contact surfaces, shall not be reused.

B. Build forms to shapes, lines, grades and dimensions indicated. Construct form work to maintain tolerances required by ACI 301. Forms shall be substantial, tight to prevent leakage of concrete, and properly braced and tied together to maintain position and shape. Butt joints tightly and locate on solid backing. Chamfer corners where indicated. Form bevels, grooves and recesses to neat, straight lines. Construct forms for easy removal without hammering, wedging or prying against concrete.

C. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.

D. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.

E. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.

F. Slope tie-wires downward to outside of wall.

G. Brace, anchor and support all cast-in items to prevent displacement or distortion.

H. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.

I. Concrete paving, Curbs, Curb and Gutters, Ramps:

1. Expansion Joints: Install at locations indicated, and so that maximum distance between joints is 20’ for exterior concrete unless otherwise shown. Expansion joint material shall be full depth of concrete section. Recess for backer rod and sealant where required. Expansion joints shall not exceed ¼ inch depth measured from finish surface to top of felt or sealant, and ½ inch width.
2. Curbs, Valley Gutter, and Curb & Gutter: Install expansion joints at 60’ on center, except when placing adjacent to concrete walks, the expansion joints shall align with the expansion joints shown for the concrete walks. Expansion joint material shall be full depth of concrete section. Recess for backer rod and sealant will be required.
3. Isolation Joints: 3/8” felt between walls and exterior slabs or walks so that paved areas are isolated from all vertical features, unless specifically noted otherwise on plans.
4. Exterior Concrete Paving: Install expansion joints at 20’ on center maximum, both directions, unless shown otherwise on plans.
5. Ramps; whether shown or not all ramps shall have control joints and expansion joints.

    a. Control joints on ramps shall be aligned and be placed in between with the vertical posts for the handrails. The curbs, if required shall have control joints that align with the handrail posts.
    b. Expansion joints shall be placed at the upper, intermediate, and bottom landings.

3.05 FORM COATING

A. Before placement of reinforcing steel, coat faces of all forms to prevent absorption of moisture from concrete and to facilitate removal of forms. Apply specified material in conformance with manufacturer's written directions.

B. Before re-using form material, inspect, clean thoroughly and recoat.

C. Seal all cut edges.

3.06 INSTALLATION

A. General: Reinforcement shall be accurately placed at locations indicated on the drawings

within required tolerances and providing required clearances. Reinforcement shall be secured prior to placement of concrete such that tolerances and clearances are maintained. Coverage shall be in accordance with Section 1907A.7 of the CBC. Keep a person on the job to maintain position of reinforcing as concrete is placed. Reinforcement must be in place before concreting is begun. Install dowels as shown on drawings. Give notice whenever pipes, conduits, sleeves, and other construction interferes with placement; obtain method of procedure to resolve interferences. All expansion and construction joints in concrete shall have dowels of size and spacing as shown, or as approved by Engineer.

B. Placing Tolerances:

1. Per ACI 301 or CRSI/WCRSI Recommended Practice for Placing Reinforcing Bars, unless otherwise shown.
2. Clear distance between parallel bars in a layer shall be no less than 1", the maximum bar diameter not 1 ½ times the maximum size of coarse aggregate.

C. Splices:

1. General: Unless otherwise shown on drawings, splice top reinforcing at midspan between supports, splice bottom reinforcing at supports and stagger splices at adjacent splices 5 foot minimum. Bar laps shall be wired together. Reinforcing steel laps shall be as follows:
   a. Lap splices in concrete: Lap splice lengths shall not be less than 62 bar diameter for No. 5 bar, 56" minimum for No. 6 bars. No. 4 bar shall have a minimum of 24" splice. 93 bar diameters for No. 7 bars and larger.
   b. All splices shall be staggered at 5 feet minimum.

3.07 INSPECTION

A. Slope of concrete forms and finish condition shall be checked with a two foot (2') digital level.

3.08 PLACING OF CONCRETE

A. Adjacent finish surfaces shall be protected at all times during the concrete pour and finishing. Verify that all formwork is tight and leak-proof before concrete is poured. Finish work defaced during the concrete pour and finishing shall be replaced at no extra cost to the owner.

B. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients. Deposit as close as practicable in final position to avoid re-handling or flowing. Partially hardened concrete must not be deposited in work. Concrete shall not be wheeled directly on top of reinforcing steel.

C. Placing: Once started, continue concrete pour continuously until section is complete between predetermined construction joints. Prevent splashing of concrete onto adjacent forms or reinforcement and remove such accumulation of hardened or partially hardened concrete from forms or reinforcement before work proceeds in that area. Free fall of concrete shall not to exceed 4'-0" in height. If necessary, provide lower openings in forms to inject concrete and to reduce fall height.

D. Remove form spreaders as placing of concrete progresses.

E. Place footings as monolithic and in one continuous pour.

F. Keep excavations free of standing water, but moisture condition sub-grade before concrete placement.

G. Compacting: All concrete shall be compacted by mechanical vibrators. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrating shall not be applied to concrete which has already begun to initially set nor shall it be continued so long as to cause segregation of materials.

H. Concrete Flatwork:

1. All flatwork shall be formed and finished to required line and grades. Flatwork shall be true and flat with a maximum tolerance of 1/8" in 10' for flatness. Flatwork which is not flat and are outside of the maximum specified tolerances shall be made level by the Contractor at no additional expense to the Owner.
2. Thoroughly water and soak the flatwork subgrade as required to achieve required moisture content prior to the concrete pour. Provide damming as required to keep water within the formed area and to allow for proper saturation of the subgrade.
3. Concrete vibrator shall be used to assist concrete placement. Contractor shall have spare concrete vibrator on site during concrete placement.

I. Placing in hot weather: Comply with ACI 305R-10. Concrete shall not exceed 85 degrees F at time of placement. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface dry checking. Concrete shall be kept wet continuously after tempering until implementation of curing compound procedure in accordance with this specification.

J. Placing in cold weather: Comply with ACI 306R-16. Protect from frost or freezing. No antifreeze admixtures are permitted. When deposited concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F. Concrete shall be maintained at temperature of at least 50 degrees F for not less than 72 hours after placing or until it has thoroughly hardened. Provide necessary thermal coverings for any flat work exposed to freezing temperatures.

K. Horizontal construction joint: Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting. If contact surface becomes contaminated with soil, sawdust or other foreign matter, clean entire surface and re-chip entire surface to assure proper adhesion.

3.09 CONCRETE FINISHES

A. Concrete Slab Finishing: Finish slab as required by ACI 302.1R. Use manual screeds, vibrating screeds to place concrete level and smooth. Use "jitterbugs" or other special tools designed for the purpose of forcing the course aggregate below the surface leaving a thick layer of mortar 1 inch in thickness. Surface shall be free from trowel marks, depressions,

ridges or other blemishes. Tolerance for flatness shall be 1/8" in 10'. Provide final finish as follows:

1. Flatwork, medium broom finish: Typical finish to be used at all exterior walks and stairs.
2. Ramps, heavy broom finish: Concrete surfaces with slope greater than 5% including all ramps. Brooming direction shall run perpendicular to slope to form non-slip surface
3. Under no circumstances can water be added to the top surface of freshly placed concrete.

B. Curb Finishing: Steel trowel.

C. Joints and Edges: Mark-off exposed joints, where indicated, with ¼" radius x 1" deep jointer or edging tool. Joints to be clean, cut straight, parallel or square with respect to concrete walk edge. Tool all edges of exposed expansion and contraction joints, walk edges, and wherever concrete walk adjoins other material or vertical surfaces.

1. The expansion joints shall be full depth as shown in the plan details. Failure to do so will result in non-compliance and shall be immediately machine cut by the contractor at his expense.

D. Exposed Concrete Surface Finishing (not including top surface of flatwork): Remove fins and rough spots immediately following removal of forms from concrete which is to be left exposed. Damaged and irregular surfaces and holes left by form clamps and sleeves shall be patched with grout. Tie wires are to be removed to below exposed surface and holes pointed up with neat cement paste similar to procedure noted under "Patching" below. Removal of tie wires shall extend to distance of 2" below established grade lines. Ends of tie wires shall be cut off flush at all other, unexposed locations. Care shall be taken to match adjacent finishes of exposed concrete surface. After patching, all concrete that is to remain exposed, shall be sacked with a grout mixture of 1-part cement, 1 1/2- parts fine sand and sufficient water to produce a consistency of thick paint. After first wetting the concrete surface, apply mixture with a brush and immediately float entire surface vigorously using a wood float. Keep damp during periods of hot weather. When set, excess grout shall be scraped from wall with edge of steel trowel, allowed to set for a time, then wiped or rubbed with dry burlap. Entire finishing operation of any area shall be completed on the same day. This treatment shall be carried to 4" below grade, and all patching and sacking shall be done immediately upon removal of the forms.

E. Stair Treads and Risers: Tool exterior stair tread nosing per ADA requirements and as detailed. Paint or stain tooled area at every stair tread nosing or as detailed. Stair tread nosing shall contain no pockets, voids or spalls. Patching is not allowed. Damaged nosing shall be replaced.

3.10 CURING

A. Cured Concrete in Forms: Keep forms and top on concrete between forms continuously wet until removal of forms, 7 days minimum. Maintain exposed concrete in a continuous wet condition for 14 days following removal of forms.

B. Flatwork/Variable Height Curbs, Curb and gutter, Valley Gutter: Cure utilizing Curing

Compound. If applicable, the Contractor shall verify that the approved Curing Compound is compatible with the approved colorant system. Upon completion of job, wash clean per manufacturer's recommendations.

1. Curing compound shall be applied in a wet puddling application. Spotty applications shall be reason for rejection and possibly concrete removal and replacement at the contractor's expense with no compensation from the owner.

3.11 DEFECTIVE CONCRETE

A. Determination of defective concrete shall be made by the Architect or Engineer. His opinion shall be final in identifying areas to be replaced, repaired or patched.

B. The Owner reserves the right to survey the flatwork, if it is determined to be outside of the maximum tolerance for flatness. If the flatwork is found to be out of tolerance, then the Contractor will be required to replace concrete. The Contractor will be responsible for reimbursing the Owner for any surveying costs incurred. Determination of flatwork flatness, surveying and any remedial work must be completed far enough in advance so that the project schedule is maintained, delays are avoided and the new flatwork or flatwork repairs are properly cured.

C. As directed by Architect, cut out and replace defective concrete. All defective concrete shall be removed from the site. No patching is to be done until surfaces have been examined by Architect and permission to begin patching has been provided.

D. Permission to patch any area shall not be considered waiver of right, by the Owner, to require removal of defective work, if patching does not, in opinion of Architect, satisfactorily restore quality and appearance of surface.

E. Defective concrete is:

2. Concrete that does not match the approved mix design for the given installation type.
3. Concrete not meeting specified 28-day strength.
4. Concrete which contains rock pockets, voids, spalls, transverse cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.
5. Concrete which is incorrectly formed, out of alignment or not plumb or level.
6. Concrete containing embedded wood or debris.
7. Concrete having large or excessive patched voids which were not completed under Architect's direction.
8. Concrete not containing required embedded items.
9. Excessive Shrinkage, Traverse cracking, Crazing, Curling; or Defective Finish. Remove and replace if repair to an acceptable condition is not feasible.
10. Concrete that is unsuitable for placement or has set in truck drum for longer than 90 minutes from the time it was batched.
11. Expansion joint felt that is not isolating the full depth of the concrete section, and recessed as required for backer rod and sealant where required.
12. Concrete that is excessively wet or excessively dry and will not meet the minimum or maximum slump required per mix design.

13. Finished concrete with oil stains from equipment use, and or rust spots that cannot be removed.
14. Control joints (weakened planed joints) that do not meet the required minimum depth shown on the drawings.

F. Patching: Install specified Patching Mortar per manufacturer's recommendations. REPAIRS TO DEFECTIVE CONCRETE WHICH AFFECT THE STRENGTH OF ANY STRUCTURAL CONCRETE MEMBER OR COMPONENT ARE SUBJECT TO APPROVAL BY THE ARCHITECT AND DSA.

3.12 CONCRETE TESTING

A. Comply with CBC Section 1903A, 1905A.1.16, 1910A and 1705A.3 and as specified in B. below. Costs of tests will be borne by the Owner.

B. Four identical cylinder 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. In addition, samples for strength tests for each class of concrete shall be taken for seven-day tests at the beginning of the concrete work or whenever the mix or aggregate is changed.

C. Strength tests will be conducted by the Testing Lab on one cylinder at seven (7) days and two cylinders at twenty-eight (28) days. The fourth remaining cylinder will be available for testing at fifty-six (56) days if the 28-day cylinder test results do not meet the required design strength.

D. On a given project, if the total volume of concrete is such that the frequency of testing required by paragraph B. above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

E. Cost of retests and coring due to low strength or defective concrete will be paid by Owner and back-charged to the Contractor.

F. Each truck shall be tested for slump before concrete is placed.

3.13 REMOVAL OF FORMS

A. Remove without damage to concrete surfaces.

B. Sequence and timing of form removal shall insure complete safety of concrete structure.

C. Concrete shall not be subjected to superimposed loads (structure or construction equipment) until it has attained its full design strength and not for a period of at least 21 days after placing. Concrete systems shall not be subjected to construction loads in excess of design loads.

3.14 CLEANING

A. Refer to Section 01 74 00.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

C. Clean excess material from surface of all concrete walks and utility structures.

D. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION

PART 1 - GENERAL

Construction Documents and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.01 DESCRIPTION

A. Scope of Work: Furnish all labor, materials, tools, equipment, and transportation required to perform and complete the installation of an automatic sprinkler irrigation system, including all piping, sprinkler heads, controls, connections, testing, etc. aas shown on the Drawings and as specified herein. The water source for this project is potable water.

B. Utilize and accept as standards manufacturer's recommendations and/or installation details for any information not specifically detailed on the Drawings.

1.02 RELATED SECTIONS

A. SUBMITTAL PROCEDURES: Section 01 33 00.

B. CLOSEOUT PROCEDURES: Section 01 77 00.

C. SUSTAINABLE DESIGN REQUIREMENT: Section 01 81 13.

D. CONCRETE FORMING: Section 03 10 00.

E. ELECTRICAL: Division 26.

F. FINISH GRADING: Section 31 10 00.

G. EARTHWORK: Section 31 00 00.

H. SITE CONCRETE: Section 32 16 00.

I. LANDSCAPING: Section 32 90 00.

1.03 GUARANTEE

A. Guarantee all workmanship and materials hereunder against defective workmanship and materials, including damage by leaks and settlement of irrigation trenches, for the duration specified in Division 01 of these Specifications. (The Contractor is not responsible for vandalism or theft after date of final acceptance.)

1.04 QUALITY CONTROL

A. Qualifications of Contractor: Work must be completed by a licensed Landscape Contractor. Provide proof of five years of continuous experience in landscaping and irrigation of projects of similar size (+\- 20% of the construction cost) and scope for education campuses. Contractor to have a minimum of two projects either completed or in construction in the last five years.

B. Work Force: Ensure that an experienced foreman is present at all times during installation. Keep the same foreman and workers on the job from commencement to completion.

C. Reviews: Specifically request reviews of all items listed below in “Inspection Requirements” prior to progressing to the next level of work.

D. Certification: Ensure that the contractor installing the Central Control System is trained and certified in the installation of the Central Control System. The training and certification must have been completed within two years prior to the installation date.

E. Standards:

1. Provide work and material in full accordance with the rules and regulations of the National Electric Code; the Uniform Plumbing Code; and other applicable state or local laws or regulations.

2. Furnish, without extra charge, additional material and labor required to comply with these rules and regulations, though the work may not be specifically indicated in the Specifications or Drawings.

3. Where the Specification requirements exceed those of the above-mentioned codes and regulations, comply with the requirements in the Specifications.

F. Delivery, Storage, and Handling:

1. Use all means necessary to protect irrigation system materials before, during, and after installation and to protect related work and material.

2. Handle plastic pipe carefully, especially protecting it from prolonged exposure to sunlight. Store pipe on beds that are the full length of the pipe, and keep pipe flat and off the ground with blocks.

G. Comply with the requirements of Section 01 77 00 – CLOSEOUT PROCEDURES.

1.05 INSPECTION REQUIREMENTS

A. Request and hold a pre-construction meeting prior to beginning the work of this Section. Parties required to be in attendance are the Landscape Contractor, Project Inspector, Owner’s Representative, and the Landscape Architect.

B. Prior to commencement of the work of this Section, obtain written verification from the project Civil Engineer that the rough grade in landscape areas is in conformance with Section 31 00

00 - EARTHWORK.

C. Obtain verification from Project Inspector for the following at the appropriate times during construction and prior to further progression of work in this Section:

1. Pressure testing of all mainlines and lateral lines (See “Hydrostatic Tests – Open Trench” in Part 3.18 of this Section),

2. Trench depth,

3. Sleeves under pavement,

4. Flushing of all mainlines and lateral lines,

5. Installation of mainline thrust blocks,

6. Backfill and pipe bedding,

7. Layout of heads,

8. Operation of system and coverage adjustments (with Landscape Architect) after system is fully automated and operational, backfill of trenching is completed, and surface has been restored to original grades.

D. In case of failure to obtain any verification by the Project Inspector as required above, remove and replace work as necessary to obtain the verification at no additional cost to the Owner.

1.06 SUBMITTALS AND SUBSTITUTIONS

A. Comply with requirements of Section 01 33 00 – SUBMITTAL PROCEDURES.

B. Product names are used as standards; provide proof as to equality of any proposed material and do not use other materials or methods unless approved in writing by the Owner’s Representative. Submit no more than one request for substitution for each item. The decision of the Owner’s Representative is final.

C. Use equipment capacities specified herein as the minimum acceptable standards.

D. List materials in the order in which they appear in Specifications; include substitutions. Submit the list for approval by the Owner’s Representative.

E. Make any mechanical, electrical, or other changes required for installation of any approved, substituted equipment to satisfaction of Owner’s Representative and without additional cost to Owner. Approval by Owner’s Representative of substituted equipment and/or dimensional drawing does not waive these requirements.

F. Do not construe approval of material as authorization for any deviations from Specifications unless attention of Owner’s Representative has been directed to specified deviations.

1.07 PROJECT CONDITIONS, AND PROTECTION

A. Information on Drawings relative to existing conditions is approximate. During progress of construction, make deviations necessary to conform to actual conditions, as approved by Owner's Representative, without additional cost to Owner. Accept responsibility for any damage caused to existing services. Promptly notify Owner's Representative if services are found which are not shown on Drawings.

B. Protect existing trees-to-remain as specified in "Existing Tree Protection" in Part 3.02 of this Section and specification section 31 13 16, TREE PROTECTION.

C. Protect existing utilities within construction area. Repair damages to utility lines that occur as a result of operations of this work.

D. Verify dimensions at building site and check existing conditions before beginning work. Make changes necessary to install work in harmony with other crafts after receiving approval by Owner's Representative.

1.08 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Furnish three complete sets of operating maintenance instructions bound in a hardback binder and indexed. Start compiling data upon approval of list of materials. Do not request final inspection until booklets are approved by Owner's Representative.

B. Incorporate the following information in these sets:

1. Complete operating instructions for each item of irrigation equipment.

2. Typewritten maintenance instructions for each item of irrigation equipment.

3. Manufacturer's bulletins which explain installation, service, replacement parts, and maintenance.

4. Service telephone numbers and/or addresses posted in an appropriate place as designated by Owner's Representative.

1.09 RECORD DRAWINGS

Upon completion of work, and as a precedent to final payment, deliver to Owner's Representative one complete set of reproducible originals of Drawings showing work exactly as installed. (See "Record Drawings" in Part 3.21 of this Section)

PART 2 - PRODUCTS

2.01 GENERAL

Use materials as specified; any deviation from the Specifications must first be approved by the Owner's Representative in writing. All material containers or certificates shall be clearly marked by manufacturer as to contents for inspection.

2.02 MATERIALS

A. Automatic Controller: As indicated on Drawings.

B. Master Valves and Flow Sensors: As indicated on Drawings.

C. Automatic Control Valves: As indicated on Drawings.

D. Gate Valve: As indicated on Drawings.

E. Pipe and Fittings:

1. PVC pipe: As indicated on Drawings.

2. PVC fittings three-inch (3") size and smaller: High impact, standard weight, Schedule 40, molded PVC as manufactured by George Fischer, Lasco, Spears, or approved equal.

3. PVC fittings four-inch (4") size and larger: High impact, standard weight, Class 200 gasketed, molded PVC as manufactured by George Fischer, Lasco, Spears, or approved equal.

4. All plastic pipe and fittings: Continuously and permanently marked with manufacturer's name, type of material, IPS size, schedule, NSF approval, and code number.

5. Threaded PVC pipe and nipples: IPS Schedule 80 when necessary to use threaded connections to gauges, valves, or control valves. Threaded adapters may be used in place of nipples when making pipe to valve connections.

6. Use 45-degree fittings for changes in depth of pipe, and at transition from main line to automatic control valves.

7. Piping above ground: Schedule 40 galvanized steel with cast-iron fittings.

8. Piping used for electrical purposes to be Schedule 40 PVC Rigid Nonmetallic Conduit electrical conduit.

F. PVC Primer: Weld-On P-70 Purple Primer or approved equal.

G. PVC Glue: Weld-On 711 Gray heavy bodied PVC Cement or approved equal.

H. Sprinkler Heads: As indicated on Drawings.

I. Quick Coupler Valves: As indicated on Drawings.

J. Sleeves: As indicated on Drawings.

K. All Valve Boxes and Covers: Manufactured, green with “Irrigation – Non-Potable” permanently embossed on cover. Carson, Rainbird or approved equal.

L. Reduced Pressure Backflow Preventer: As indicated on Drawings.

M. Automatic Sprinkler Control Wire:

1. Connections between remote control valves and controller: UF-14 direct burial plastic polyethylene (PE) insulated wire, Paige Electric P7079D or approved equal. Common wire to be white, and lead wire to be colored. If multiple controllers are used, a different color is to be used for each controller's lead wire. (Use red for the first controller). Spare wires are to be yellow.

2. UL Listed waterproof sealing pack for wire connections: 3M DBR/Y-6, or approved equal.

3. Provide adequate working space around electrical equipment in compliance with local codes and ordinances.

4. Electrical, other than low voltage, such as power wiring, conduit, fuses, thermal overloads and disconnect switches, is included under Division 26 of these Specifications.

N. Trace Wire:

1. Direct burial #12 AWG Solid, steel core soft drawn tracer wire, 250# average tensile break load, 30 mil high molecular-high density polyethylene jacket complying with ASTM-D-1248, 30-volt rating. Color shall be green.

2. Connectors: UL Listed waterproof sealing pack for wire connections: 3M DBR/Y-6, or approved equal.

O. Master Valve and Flow Sensor Wire:

1. Master valve wires are to be UF-14 direct burial plastic-coated wire. Wire color to be blue for the lead and white for the common. If there are two master valves, the second master valve wire is to be blue/white striped for the lead and white for the common.

2. Flow sensor wires are to be Rainbird PE-39. If there are two flow sensors, the wires leading to each flow sensor is to be a different color.

P. Unions And Flanges:

1. Steel unions and flanges two inches (2”) and smaller: 150 lb. screwed black (brass to iron seat) or galvanized malleable iron (ground joint).

2. Steel unions and flanges two and one-half inches (2 ½") and larger: 150 lb. black flange union, flat-faced, full gasket.

3. Gaskets: One-sixteenth inch (1/16") thick rubber Garlock No. 122, Johns-Manville or approved equal.

4. Flange Bolts: Open-hearth bolt steel, square heads with cold pressed hexagonal nuts, cadmium plated in ground. Provide copper-plated steel bolts and nuts or brass bolts and nuts for brass flanges.

Q. Pipe Supports: Adjustable saddle support type support.

R. Valve Identification Tags: Christy's irrigation ID tags, standard yellow color or approved equal.

S. Sand for Trench Backfill: Natural sand, free of roots, bark, sticks, rags, or other extraneous material.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

Locations of existing utilities and other improvements shown on the Drawings are approximate. Verify existing conditions and, should any utilities be encountered that are not indicated on the plans, notify the Owner's Representative immediately. Accept responsibility for any damages caused to existing services.

3.02 PREPARATION

A. Scheduling: Notify the Project Inspector prior to commencing and/or continuing the work of this Section. Remove and replace, at no cost to Owner, any work required as a result of failure to give the appropriate notification.

B. Examination: Examine conditions of work in place before beginning work; report defects.

C. Measurements: Take field measurements; report variance between plan and field dimensions.

D. Protection: Maintain warning signs, shoring and barricades as required. Prevent injury to, or defacement of, existing improvements. At no additional cost to Owner, repair or replace items damaged by installation operations.

E. Existing Tree Protection:

1. Avoid unnecessary root disturbance, compaction of soils within drip line, or limb breakage.

2. Do not store material or dispose of any material other than clean water within the drip line.

3. Provide adequate irrigation during construction.

4. Replace any tree damaged during construction with a tree of equal size and value at no additional cost to Owner.

5. Adjust trench locations in field to minimize damage to existing elements and plant roots of trees-to-remain at no additional cost to Owner.

F. Surface Preparation: Prior to beginning sprinkler irrigation work, complete placement of topsoil as specified in Section 31 00 00 – EARTHWORK. Notify Project Inspector of irregularities if any.

3.03 AUTOMATIC CONTROLLER

A. Existing controller: All wiring connections shall be neatly accomplished within the controller cabinet.

B. Connect automatic control valves to controller(s) in sequence as shown on Drawings.

C. Install all exposed wires to a minimum of twenty-four inches (24”) beyond controller within a UL approved rigid conduit.

3.04 MASTER VALVES AND FLOW SENSOR

A. Master Valve: Install as per manufacturer’s recommendation. Connect master valve wiring to the automatic controller. Install wire in a conduit. Wire is not to have any splices between the valve and the controller.

B. Flow Sensor: Install as per manufacturer’s recommendation. When using a “saddle” installation, install at the correct depth in the pipe and orientate the paddle properly for accurate reading of flow. Connect flow sensor wire to the automatic controller. Install wire in a conduit. The wire is not to have any splices between the valve and the controller.

3.05 REDUCED-PRESSURE BACKFLOW-PREVENTION DEVICE

A. Install where shown, per code, and per manufacturer’s specification and written instructions.

B. Provide pipe supports and accessories as necessary to properly secure the assembly.

3.06 GRADING

Install all irrigation features to their finished grade and at depths indicated. Complete and /or accommodate all rough grading and/or finish grading before commencing with trenching. See Section 31 10 00 – FINISH GRADING for more information.

3.07 LAYOUT

A. Lay out work as accurately as possible to Drawings. Drawings are generally diagrammatic to extent that swing joint offsets and fittings are not shown. Record all changes on the Record Drawings.

B. Do not willfully install the irrigation system as shown on Drawings when it is obvious, in the field, that obstructions or other discrepancies exist which may not have been considered in the design. Notify Owner's Representative of discrepancies before proceeding.

3.08 EXCAVATING AND TRENCHING

A. General: Perform excavations as required for installation of work included under this Section, including shoring of earth banks to prevent cave-ins. Restore surfaces, existing underground installations, etc., damaged or cut as result of this work to their original condition and in a manner approved by the Landscape Architect.

B. Width:

1. Make trenches wide enough to allow a minimum of six inches (6") between parallel pipelines and three inches (3") between side of pipe and side of trench. Do not allow stacking of pipe within trench.

2. Allow a minimum clearance of twelve inches (12") in any direction from parallel pipes of other trades.

C. Preparation of Excavations: Remove rubbish and rocks from trenches. Bed pipe on a minimum of three inches (3") of clean, rock-free soil to provide a firm, uniform bearing for entire length of pipeline. Cover pipe with a minimum of three inches (3") of clean, rock-free soil. If clean, rock-free soil is not available, use sand for pipe bedding and three inches (3") of backfill above the pipe. The remainder of the trench backfill material can be native soil. Do not allow wedging or blocking of pipe.

D. Minimum depth of cover: Unless shown otherwise, provide the following minimums:

1. Mainline: twenty-four inches (24") cover.

2. Lateral line: twelve inches (12") cover for spray heads, and eighteen inches (18") cover for rotor heads.

3. IPS drip tubing: three inches (3")

E. Conflicts with other trades:

1. Hand-excavate trenches where potential conflict with other underground utilities exist.

2. Where other utilities interfere with irrigation trenching and piping work, adjust the trench depth as instructed by Owner's Representative.

3.09 THRUST BLOCKS

A. To resist system pressure on ring-tite pipe and fittings, provide thrust blocks at any change of direction, change of size, dead end, and/or valves at which thrust develops when closed. See thrust block details for examples.

B. Use cast-in-place concrete and size thrust blocks based on an average soil-safe bearing load of 700 lbs. per square foot.

C. Form thrust blocks in such a manner that concrete comes in contact only with the fittings. Place thrust block between adequately compacted soil and the fitting.

D. Thrust blocks are to be constructed of concrete with a minimum of 2500psi.

E. Thrust blocks are to be free, separate, and independent of adjacent or nearby thrust blocks.

3.10 BACKFILL AND COMPACTING

A. General: Do not begin until hydrostatic tests are completed. When system is operating and after required tests and inspections have been made, backfill trenches under paving areas to the compaction rate specified in Section 31 00 00 – EARTHWORK.

B. Place backfill in six-inch (6”) layers and compact with an acceptable mechanical compactor.

1. Compact backfill material in landscape areas to eighty-five percent (85%) maximum dry density of the soil.

2. If settlement occurs along trenches, make adjustments in pipes, valves, and sprinkler heads, soil, sod or paving as necessary to bring the system, soil, sod or paving to the proper level or the permanent grade, without additional cost to the Owner.

C. Excess Soil: Remove all rocks, debris, and excess soil that results from sprinkler irrigation trenching operations, landscape planting, and soil preparation operations off site at no additional cost to the Owner. If soil meets topsoil requirements in Section 31 00 00 – EARTHWORK, it may be used for finish grading.

D. Finishing: Dress-off areas to eliminate construction scars.

3.11 CONTROL WIRES

A. General: Install control wires beneath sprinkler main line whenever possible; tape wires to mainline pipe. Provide one spare wire for each controller.

B. Slack Wire: Provide eighteen inches (18”) of slack wire for each wire connected to automatic control valve. Slack wire shall be coiled and left in the valve box. Tape wires in bundles every ten feet (10’); do not tape wires in sleeves.

C. Expansion and Contraction: Snake wire in trench to allow for contraction of wire.

D. Wire Passing Under Existing or Future Paving or Construction: Encase in PVC Schedule 40 or galvanized steel conduit extending at least twelve inches (12”) beyond edges of paving or construction.

E. Wire Connections: Install wire connections in a waterproof sealing pack.

F. Wire Splicing: Permit splicing only on runs exceeding 500 feet. Locate all splices within valve boxes.

G. Wire Termination: Install wire in a valve box with eighteen inches (18”) of slack wire coiled and individually capped with approved waterproof sealing pack.

H. Spare Wire: Install two (2) spare wires along each wire path. If there is more than one wire path from the controller, the contractor to install two (2) spare wires per path. Provide eighteen inches (18”) of slack wire at each automatic control valve.

3.12 TRACE WIRE

A. General: Install trace wire above sprinkler main line whenever possible; tape wire to mainline pipe at 10’ intervals to ensure the wire remains adjacent to the pipe.

B. Wire Connections: Install wire connections in a waterproof sealing pack.

C. Trace wire access points shall be accessible at all automatic control valves.

D. At all mainline end caps, a minimum of six feet (6’) of tracer wire shall be coiled and secured to the cap for future connections. The end of the tracer wire shall be spliced to the wire of a six-pound zinc anode and is to be buried at the same elevation as the irrigation mainline.

E. Testing: The contractor shall perform a continuity test on all trace wires in the presence of the client. If the trace wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire.

3.13 FLUSHING LINES

Thoroughly flush lines prior to installing valves, performing hydrostatic testing, or installing sprinklers. Divert water to prevent washouts.

3.14 AUTOMATIC CONTROL AND QUICK COUPLER VALVES

A. Install where shown and where practical; place no closer than twelve inches (12”) to walk edges, building walls, or fences. Refer to detail for example.

B. Thoroughly flush mainline before installing valve.

C. Install valves in ground cover areas where possible.

3.15 PIPING

A. General: Install in conformance with reference standards, manufacturer's written directions, as shown on Drawings and as herein specified.

B. Workmanship:

1. General: Install sprinkler irrigation equipment in planted areas throughout the site.

2. Coordination: Organize location of sleeves with other trades as required.

C. Pipe Line Assembly:

1. General:

a. Cutting: Cut pipe square; remove rough edges or burrs.

b. Solvent-welded Connections: Use materials and methods recommended by the pipe manufacturer.

c. Brushes: Use non-synthetic brushes to apply solvents and primer.

d. Cleaning: Clean pipe and fittings of dirt, moisture, and debris prior to applying solvent or primer.

e. Assembly: Allow pipe to be assembled and welded on the surface or in the trench.

f. Expansion and Contraction: Snake pipe from side to side of trench to allow for expansion and contraction.

g. Location: Locate pipes as shown on Drawings except where existing supply valves, utilities or obstructions prohibit or where slight changes are approved to better suit field conditions.

2. Flexible Elastomeric Seal Joints:

a. General: Assemble in strict conformance with the pipe manufacturer's instruction.

b. Rubber Rings: Use rubber rings specific for water service systems.

c. Cleaning: Thoroughly clean ring and groove of dirt, moisture and debris using a clean, dry cloth. Do not use solvents, lubricants, cleaning fluids or other material for cleaning.

d. Seating: Properly seat ring in groove.

e. Spigot:

1.) General: Clean spigot-end of pipe as in “Cleaning” above prior to applying lubricant recommended by pipe manufacturer.

2.) Seating: Insert spigot into bell and seat to full depth required.

3. Connections:

a. Threaded Plastic Pipe Connection:

1.) Use Teflon tape or pipe joint compound.

2.) When assembling to threaded pipe, take up joint no more than one full turn beyond hand-tight.

b. Metal Valves and Plastic Pipe: Use threaded plastic male adapters.

c. Metal to Metal Connections:

1.) Use specific joint compound or gasket material for type of joint made. Where pipe of dissimilar metals are connected, use dielectric fittings.

2.) Where assembling, do not allow more than three full threads to show when joint is made up.

d. Where assembling soft metal (brass or copper) or plastic pipe, use strap-type friction wrench only; do not use a metal-jawed wrench.

e. Threading:

1.) Do not permit the use of field-threading of plastic pipe or fittings. Use only factory-formed threads.

2.) Use factory-made nipples wherever possible. Permit the use of field-cut threads in metallic pipe only where absolutely necessary. When field-threading, cut threads accurately on axis with sharp dies.

3.) Use pipe joint compound for all threaded joints. Apply compound to male thread only.

4. Sleeves and conduits:

a. Use sleeves of adequate size to accommodate retrieval for repair of wiring or piping and extend a minimum of twelve inches (12”) beyond edges of walls or paving.

b. Provide removable, non-decaying plug at end of sleeve to prevent entrance of soil.

5. Unions: Locate unions for easy removal of equipment or valve.

6. Joint Restraints: Install per manufacturer's recommendations.

7. Capping: Plug or seal opening as lines are installed to prevent entrance materials that would obstruct pipe. Leave in place until removal is necessary for completion of installation.

D. Drip Irrigation Tubing: Install as per Drawings.

3.16 SPRINKLER HEADS

A. Sprinkler heads: Locate as shown on the Drawings except where existing conditions prohibit, or slight changes are approved to achieve as good or better coverage under the same conditions. Do not allow sprinkler head spacing to exceed the maximum shown on the Drawings. Plumb heads.

B. Handling, Assembly of Pipe, Fittings, and Accessories: Allow only skilled tradesmen to handle and assemble pipe, fittings and equipment. Keep interior of pipes, fittings and accessories clean at all times. Close ends of pipe immediately after installation; leave closure in place until removal is necessary for completion of installation. Do not permit bending of pipe.

C. Flushing: Remove end heads and operate system at full pressure until all rust, scale, and sand is removed. Divert water to prevent ponding or damage to finished work.

D. Coverage: Accept responsibility for full and complete coverage of irrigated areas to satisfaction of Landscape Architect and make necessary adjustments to better suit field conditions at no additional costs to Owner.

3.17 CONCRETE WORK

Underground anchors and pads for valves boxes are included under this Section of Specifications. Concrete shall have a minimum strength of 2500 psi. The slump test shall be a four inch (4") maximum slump. At twenty-eight days, the concrete shall have a minimum strength of 2500 psi. Use materials and mix in accordance with ASTM C 94. Refer to Section 32 16 00 SITE CONCRETE.

3.18 FIELD QUALITY CONTROL

A. Visual Inspection: Verify that all pipe is homogenous throughout and free from visual cracks, holes, or foreign materials. Inspect each length of pipe. All materials are subject to impact test at the discretion of the Landscape Architect.

B. Hydrostatic Tests – Open Trench:

1. Center-load piping with a small amount of backfill to prevent arching or slipping under pressure.

2. Request the presence of the Project Inspector in writing at least forty-eight hours in advance of testing.

3. At no additional cost to Owner, test in the presence of the Project Inspector.

4. Apply continuous static water pressure of 100 psi when welded plastic joints have cured at least twenty-four hours, and with the risers capped, as follows: test main lines and submains for four hours; test lateral lines for two hours.

5. Repair leaks resulting from tests; and repeat tests.

6. Test to determine that all sprinkler heads function according to manufacturer's data and give full coverage according to intent of Drawings. Replace any sprinklers not functioning as specified with ones that do, or otherwise correct system to provide satisfactory performance.

C. Continuity Testing: Test locating device and control wires for continuity prior to and after back-filling operations.

3.19 CLEAN-UP

Remove debris resulting from work of this Section.

3.20 ADJUSTMENTS AND MAINTENANCE

A. Adjusting System: Prior to acceptance, satisfactorily adjust and regulate entire system. Set watering schedule on controller appropriate to types of plants and season of year. Adjust remote control valves to operate sprinkler heads at optimum performance based on pressure and simultaneous demands through supply lines.

B. System Layout: Provide reduced prints of Record Document irrigation plans, laminated in four (4) mil. plastic, of size to fit controller door. Enlarge remote-control valve designations as necessary for legibility. Color-code areas covered by each station. Affix plans to inside of controller door.

C. Instructions: Upon completion of work, instruct maintenance personnel on operation and maintenance procedures for entire system.

D. Flow Charts: Record and prepare an accurate flow-rate chart for each automatic control valve.

3.21 RECORD DRAWINGS

A. Regularly update plans of the system and any changes made to the system throughout the project. Record all changes on this plan before trenches are back-filled.

B. Record the as-built information on reproducible plans provided by the Architect. Complete and submit the Record Drawings to the Architect before applying for payment for work installed.

C. As-built drawings are to be completed electronically with a pdf editing software or computer aided drafting software. As-built drawing done by hand will not be accepted for final submittal.

D. Show the following on the Record Drawings accurately to scale and dimensioned from two permanent points of reference:

1. Distance of mainline from nearby hardscape.

2. Location of automatic control valves, quick couplers, and gate valves.

3. Location and size of all sleeves.

4. Location of automatic control wires and spares.

5.

3.22 OPERATION MANUALS

Deliver two complete sets of manufacturer's warranties, Contractor guarantees, instruction sheets, parts lists and operation manuals to the Architect before requesting final acceptance of the project. Do not request final inspection until the sets are approved.

END OF SECTION

LANDSCAPING

Section 32 80 00
21-32-051

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish all labor, materials, tools, equipment, and transportation required to perform and complete the following work as specified herein:

1. Soil Preparation and Fertilization
2. Planting
3. Hydroseeding and/or Sodding
4. Weed Control
5. Mulch
6. Clean-up
7. Landscape Maintenance Period
8. Guarantee

B. Work not included in this Section: Landscape elements such as concrete walks, fencing, outdoor lighting, rough grading, and clearing are not a part of this Section unless shown on the landscape Drawings.

C. Construction Documents and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications sections, apply to this section.

1.02 RELATED SECTIONS

A. SUBMITTAL PROCEDURES: Section 01 33 00.

B. CLOSEOUT PROCEDURES: Section 01 77 00.

C. SUSTAINABLE DESIGN REQUIREMENT: Section 01 81 13

D. FINISH GRADING: Section 31 10 00.

E. EARTHWORK: Section 31 00 00.

F. IRRIGATION: Section 32 80 00.

1.03 GUARANTEE

A. The guarantee period for lawn and plant material shall be the duration of the landscape maintenance period, from commencement until final acceptance of the work of this Section. See Division 01 for other applicable guarantee requirements.

B. During the guarantee period, repair and/or replace plants and lawn not in satisfactory growing condition, as determined by Owner's Representative, without additional cost to Owner. Plants are to be replaced as per "Landscape Maintenance" in Part 3.12 of this Section, using plants of the same kind and size specified in plant list.

1.04 QUALITY CONTROL

A. Qualifications: Work must be completed by a licensed Landscape Contractor. Provide proof of five years of continuous experience in landscaping and irrigation of projects of similar size (+\- 20% of the construction cost) and scope for education campuses. Contractor to have a minimum of two projects either completed or in construction in the last five years.

B. Work Force: Ensure that an experienced foreman is present at all times during installation. Keep the same foreman and workers on the job from commencement to completion.

C. Reviews: Specifically request reviews of all items listed below in "Inspection Requirements" prior to progressing to the next level of work. The Owner's Representative reserves the right to inspect and reject material, both at place of growth and at site, before and/or after planting, for compliance with requirements for name, variety, size and quality.

D. Reference Standards: Meet or exceed Federal, State and County laws requiring inspection of all plants and planting materials for plant disease and insect control.

E. Delivery, Storage, and Handling:

1. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

2. Bulk Materials:

a. Do not dump or store bulk materials near structures, utilities, walkways or pavements, or on existing turf areas or plants.

b. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

c. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

F. Plant Material:

1. Conform to the current edition of Horticultural Standards for quality of Number 1 grade nursery stock as adopted by the American Association of Nurserymen. Conform to sizes specified on plant legend. Select plants which have a natural shape and appearance.

2. Select only plants that are true to name, and tag one of each bundle or lot with the name of the plant in accordance with the standards of practice of the American Association of Nurserymen. In all cases, botanical names shall take precedence over common names.

3. Tag each plant of a patented variety with the variety and identification number, where applicable, as it is delivered to the job site.

4. Select only plants which have been nursery-grown in accordance with good horticultural practices and which have been grown under climatic conditions similar to those in the locality of the project for at least one year.

5. Select only plants which are typical of their species or variety; have normal habits of growth; are sound, healthy, vigorous, well-branched and densely-foliated when in leaf; are free of disease, insect pests, eggs or larvae; and have a healthy and well-developed root system.

6. Select only container stock that has been grown in the containers in which delivered for at least six (6) months, but not over two (2) years. Provide samples to show that there are no root-bound conditions.

7. Do not use plants that are severely pruned or headed-back to meet size requirements.

8. Do not plant container-grown plants that have cracked or broken balls of earth when taken from the container. Remove canned stock carefully from cans after containers have been cut on two sides with tin snips or other approved cutter.

9. Coordinate a time for the Landscape Architect to inspect the plants upon their delivery to the project site.

10. At any time prior to final acceptance, be prepared to replace any plants that are rejected by the Owner's Representative because of physical damage to the plant.

11. Do not remove container-grown stock from containers before time of planting.

12. Be prepared to replace plants which are rejected by the Owner's Representative for the following reasons:

    a. Trunk bark damage caused by sunburn,

    b. Trunk bark wounds caused by rubbing stakes or ties,

    c. Trunk bark damage caused by ties that have girdled the tree,

d. Tree head development that is lopsided and not symmetrical in form,

e. Tree branches that cross or touch,

f. Tree branches with double leaders (unless multi-trunk trees are specified).

13. Stake shrubs with one-inch by one-inch by eighteen-inch (1”x1”x18”) stakes in such manner that the stakes are not visible, and tie to upright position if they lean and/or are not growing in a vertical position.

14. Furnish quantities necessary to complete the work as shown on the Drawings and, if necessary, make up for any discrepancies in the quantities given in the Plant List at no additional cost to Owner.

G. Comply with the requirements of Section 01 77 00 – CLOSEOUT PROCEDURES.

1.05 INSPECTION REQUIREMENTS

A. Landscape Architect reserves the right to examine and reject plant material both at place of growth and at site, before and after planting, for compliance with requirements of name, variety, size, and quality.

B. Request and hold a pre-construction meeting prior to beginning the work of this Section. Parties required to be in attendance are the Landscape Contractor, Project Inspector, Owner’s Representative, and Landscape Architect.

C. Obtain verification from Project Inspector for the following at the appropriate times during construction and prior to further progression of work in this Section:

1. Rough grading is to tolerances specified in Section 31 00 00 – EARTHWORK.

2. The placement of landscape backfill material is as specified in this Section.

3. Prior to the commencement of the work specified in this Section, the coverage and operation of the sprinkler irrigation system are as specified in Section 32 80 00 - IRRIGATION.

4. The soil amendment does not include any metal fragments. (Obtain a letter from the manufacturer stating that the material submitted for use on this project has no metal or foreign objects. Submit this letter as part of the Data Sheet submittal package [see “Submittals and Substitutions” in this Section])

5. Required Test: For each load of soil amendment delivered to the site, spread at least two cubic yards (2 cy) of material onto a paved surface approximately two inches (2”) deep. Pass a magnetic rake over the material in two directions. If any metal is found, test the entire load in the same manner. Perform all testing in the presence of the Project Inspector.

6. Soil amendments, fertilizer, bark mulch and materials used for hydroseeding have been delivered to the site by the supplier, the invoices from the supplier indicate the project name and quantities delivered, and the Project Inspector has received copies of all such documents.

7. Prior to planting, amendments and conditioners have been incorporated as per pre-planting recommendations, and planting areas have been made ready to receive planting.

D. In case of failure to obtain any verification by the Project Inspector as required above, remove and replace work as necessary to obtain the verification at no additional cost to the Owner.

E. Beginning of Maintenance Period: Verify all work is complete, then request and hold a meeting to include the Landscape Architect, Project Inspector, Architect and Owner's Representative for authorization to begin the landscape maintenance period.

F. End of Maintenance: Verify that all work is complete and acceptable, and that the maintenance has been completed per specifications; and continue to provide landscape maintenance until the Owner's Representative has accepted the work.

1.06 SUBMITTALS AND SUBSTITUTIONS

A. See Section 01 33 00 – SUBMITTAL PROCEDURES for additional requirements.

B. Plant Material: Within fifteen (15) days after award of contract, locate plant materials required for construction. Ensure that trees and shrubs are contract- grown from a certified nursery. Notify Owner's Representative of plant material "tied off" for review at selected nursery. If specified material is not obtainable, submit the following to Owner's Representative: proof of non-availability, proposal for use of equivalent material, photographs of alternative choices of plant material. Include clear, written description of type, size, condition, and general character of plant material.

C. Data Sheets: Provide product data for each type of landscape material indicated in the Drawings and Specifications.

D. Samples: Submit samples of the following materials to Landscape Architect for approval:

1. Soil amendment: (3) one-quart zip-locked plastic bags.

2. Bark Mulch: (3) one-quart zip-locked plastic bags.

3. Imported Topsoil: (3) one-quart zip-locked plastic bags. (if needed)

E. Provide soils analysis reports prepared by a qualified soils laboratory in compliance with the Soil Testing Requirements under "Soil Testing" in Part 3.02 of this Section.

F. Prior to planting, submit copies of all trucking or packaging tags for all soil amendment, fertilizer and other additives to Landscape Architect so the quantities can be verified.

1.07 PROTECTION AND CLEAN-UP

A. Provide protection for persons and property throughout progress of work. Use temporary barricades as required. Proceed with work in such manner as to minimize spread of dust and flying particles and to provide safe working conditions for personnel. Store materials and equipment where directed.

B. Existing Construction: Execute work in an orderly and careful manner to protect paving, work of other trades, and other improvements.

C. Existing Utilities: Provide protection for existing utilities within construction area. At no additional cost to Owner, repair any damages to utility lines that occur as a result of this work.

D. Landscaping: Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods.

E. Paving: Maintain cleanliness of paving areas and other public areas used by equipment, and immediately remove spillage; remove rubbish, debris, and other material resulting from landscaping work, leaving site in a safe and clean condition.

1.08 PLANTING SCHEDULE / ENVIRONMENTAL REQUIREMENTS

A. Install, establish, and maintain all lawn areas for a minimum of ninety (90) days prior to date of substantial completion. Coordinate schedule with other work and overall project schedule. Failure to install lawn areas by this date shall result in assessment of liquidated damages.

B. Proceed with work in an orderly and timely manner to complete installation of landscaping within contract limits.

C. Planting Season Limits: Do not plant when grounds are wet or temperature is below 25° F. Do not proceed with any soil preparation and fertilization if all planting cannot be completed within Planting Season Limit.

1.09 LANDSCAPE MAINTENANCE PERIOD REQUIREMENTS

A. Beginning of Landscape Maintenance Period:

1. General: Landscape Maintenance Period does not begin until all work is installed and lawn has evenly germinated to an approximated blade height of one and one-half inches (1 ½”), as determined by Landscape Architect, in writing.

2. Automatic Controller: Upon successful completion of testing by the technician from rainbird, request that a checklist/certification be completed and signed by the technician. Deliver copies of the certification to both the Owner’s Representative and the Landscape Architect prior to the commencement of the landscape maintenance period.

3. On-site Inspection: When all work is complete, request and hold a meeting to include the

Landscape Architect, Project Inspector, Architect and Owner's Representative who must together authorize and determine the start date for the landscape maintenance period. Coordinate and give notice of the date and time of the on-site meeting to all parties at least forty-eight (48) hours in advance.

4. Acceptability: In cases where the lawn has reached adequate fullness and germination in some areas but not all, and authorization has not been given to begin the maintenance period, proceed with mowing, trimming, spraying, etc., as necessary prior to the beginning of the maintenance period.

B. Duration of Landscape Maintenance Period:

The Landscape Maintenance Period shall continue for a minimum of ninety (90) calendar days. During this time, continuously maintain all areas involved until final acceptance of the work by the Owner's Representative. See Landscape Maintenance Period procedure in Part 3.09 of this Section.

C. Final Acceptance of the Landscape Maintenance Period:

Request the final inspection forty-eight (48) hours in advance. If items require attention, hold on-site meetings until Landscape Architect can certify, in writing, and in concurrence with the Owner's Representative, the successful completion of the Landscape Maintenance Period.

1.10 RECORD DRAWINGS

Upon completion of work, and as a precedent to final payment, deliver to Owner's Representative one complete set of reproducible originals of Drawings showing work exactly as installed.

PART 2 - PRODUCTS

2.01 GENERAL

Use material in new and perfect condition as specified. Any deviations or substitutions from the Specification and Drawings must first be approved by Owner's Representative in writing prior to use.

2.02 SOIL PREPARATION MATERIALS

A. Topsoil: Fertile; friable; natural loam surface soil; reasonably free of subsoil, clay lumps, brush, weeds and other litter; and free of roots, stumps, stones/rocks, and other extraneous or toxic matter harmful to plant growth.

B. Soil Amendment: One-percent nitrogen-impregnated bark product with a ninety-percent (90%) bark base and zero to one-quarter inch (0-1/4") particle size, or approved equivalent. **Do not spread until testing requirements have been satisfied.**

C. Fertilizer/Soil Conditioner: Gro-Power Plus or approved equal.

D. Fertilizer for Trees and Shrubs: Seven-gram Gro-Power Planting Tablets (12-8-8 NPK) or approved equal.

E. Vitamin B-1: "Superthrive", "Liquinox Start", "Cal-Liquid", or approved equal.

2.03 MISCELLANEOUS LANDSCAPE MATERIALS

A. Bark Mulch: Untreated, shredded cedar.

B. Tree-staking System: As indicated on Drawings.

C. Pre-Emergent Weed Control: Oxadiazon, “Treeflan”, “Ronstar 2G”, "Surflan" (Elano Products Company), or approved equal.

D. Weed Fabric: As indicated on Drawings.

E. Header Boards: As indicated on Drawings.

F. Root Barrier: As indicated on Drawings.

2.04 PLANT MATERIAL:

A. Nursery Plant Stock:

1. As indicated on Drawings. Do not remove container-grown stock from containers until planting time. Plants shall be true to name.

2. Healthy, shapely, well-rooted, not pot-bound, free from insect pests or plant diseases and properly "hardened off" before planting. Replace plants that are not alive or are not in satisfactory growing condition, as determined by the Landscape Architect, without additional cost to Owner. The Landscape Architect may reject plants before and/or after planting.

3. Labeled. Label at least one tree and one shrub of each species with a securely-attached, waterproof tag bearing legible designation of botanical and common name.

B. Lawn Sod: Ninety percent (90%) Perennial Ryegrass and ten percent (10%) Kentucky Bluegrass.

C. Lawn Hydroseed: Premium, new crop seed, delivered to site in original, unopened containers bearing a dated guaranteed analysis. Hydroseed mixture shall be as follows:

1. Seed: Sportsclub 80/20 Rye/Blue Mix by Pacific Coast Seed or approved equal @ 8lbs/1000 sf or 350 lbs/acre.

a. 27% Pangea GLR Perennial Ryegrass

b. 26% Paragon GLR Perennial Ryegrass

c. 26% Manhattan 5 GLR Perennial Ryegrass

d. 10% Brooklawn Kentucky Bluegrass

e. 10% Bonaire Kentucky Bluegrass

2. Starter Fertilizer: 16-20-0 with biosolids or approved equal.

3. Wood Fiber Mulch: As manufactured by Conwed or approved equal.

4. Soil Binding Agent: Polyacrylamide or approved equal.

5. Herbicide: Tenacity or approved equal.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

A. Examine the site, verify grade elevations, and observe conditions under which work is to be performed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner's Representative.

B. Proceed with complete landscape work as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.

C. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand-excavate, as required, to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

D. When conditions detrimental to sod or plant growth are encountered, such as rubble fill, adverse drainage condition, or other obstructions, notify the Owner's Representative before planting.

3.02 SOIL TESTING

A. Coordinate soil testing in an expeditious and timely manner as required for on-site topsoil materials. Contract with a soil laboratory and include cost of sampling and testing in contract price. Take one (1) sample for every 5,000 square feet of landscape area up to a maximum of six (6) samples under the direction of and in the presence of the Owner's Representative.

B. Submit each sample, according to the quantity of soil required by testing laboratory, to a competent laboratory approved by the Owner's Representative.

C. Provide analysis of soil samples for pH, salinity, ammonia, phosphate, potassium, calcium, magnesium, boron, and sodium levels. Provide appraisal of chemical properties, including particle size determination, and recommendations for types and quantities of amendments and fertilizers.

3.03 PREPARATION

A. Clearing of Vegetation:

1. If live perennial weeds exist on site at the beginning of work, spray with a non-selective systemic contact herbicide as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least 15 days.

2. Clear and remove existing weeds by mowing or grubbing off all plant parts at least one-quarter inch (¼") inch below surface of soil over entire areas to be planted.

B. Soil preparation:

1. Loosen soil in all planting areas, and on slopes flatter than 3:1 gradient, to a depth of six to eight inches (6" - 8") below finish grade. All debris, foreign matter, and stones shall be removed prior to the placing of any fertilizers or conditioners. Soil preparation is for all shrub planting beds, lawn hydroseeded areas and sodded lawn areas.

2. Conduct the required soil tests and instruct the lab to include a minimum of the following soil improvements in the recommendation on the soils report.

   a. Soil Amendment: Two cubic yards (2 cy) per 1,000 square feet.

   b. Gro-Power Plus: One hundred fifty pounds (150 lbs) per 1,000 square feet.

   c. If the lab recommends less than six cubic yards (6 cy) of soil amendment, the excess bid amount shall be applied to the cost of any additional recommended soil improvements, or returned to the Owner as a credit

3. Apply amendments as follows, using rates recommended by the soils testing laboratory (the rates of amendments shown below are for bidding purposes only):

   a. Fertilizer/Soil Conditioner: Broadcast 150 pounds of Gro Power Plus per 1,000 square feet in all planting areas and rototill to a depth of six to eight inches (6" - 8"). Remove from the site any rock and debris brought to the surface by cultivations. "Cultipack" all areas to receive sod or hydroseed.

   b. Apply soil amendment to all planting areas at the rate of six cubic yards (6 cy) per 1,000 sf and rototill into the top six to eight inches (6" – 8").

4. Upon completion of finish grading, request a review and obtain approval of Landscape Architect prior to commencement of planting or hydroseeding.

C. Finish Grading for all Planting areas

1. Refer to Earthwork Specification Section for Rough Grading.

2. Grade to elevations and contours shown on Drawings. Fill low spots with landscape backfill material and grade to surface drain in manner indicated on Drawings.

3. Finish-grade so that the entire area within the contract lines has a natural and pleasing appearance as specified and as directed by Landscape Architect.

4. Adjust sprinkler heads flush to finish grade in preparation to receive hydroseeding or one-half inch above finish grade in preparation to receive sod. Reset sprinkler heads flush to grade after turf has germinated.

5. Flag the sprinkler heads and valve markers.

D. Planting Pits for Trees:

1. Excavate pits with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage.

2. Set container-grown stock in center of pit on earth pedestal. Separate roots and/or prune roots as directed by Landscape Architect. In hot weather, pre-wet pit. Loosen outside roots from sides and bottom of root ball. When set, place additional backfill around base and sides of root ball. Work each layer to settle backfill and eliminate voids and air pockets. Water after placing final layer of backfill.

3. Loosen hard subsoil in bottom of excavation. Extend excavation as required to insure proper drainage from plant pits.

4. Fill excavated planting pits with water to half the depth of pit. Pits should drain within four hours (4 hrs). If planting pits do not drain, notify Project Inspector immediately. Do not proceed with planting until Landscape Architect has resolved a method to provide drainage.

E. Planting Pits for Shrubs/Groundcover:

1. Excavate pits and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage.

2. Loosen hard subsoil in bottom of excavation. Extend excavation as required to insure proper drainage from plant pits.

3. Fill excavated planting pits with water to half the depth of pit. Pits should drain within four hours (4 hrs). If planting pits do not drain, notify Project Inspector immediately. Do not proceed with planting until Landscape Architect has resolved a method to provide drainage.

3.04 ROOT BARRIER INSTALLATION

A. Root barriers location are specifically shown on the plan. If a tree is moved during construction to a location where root barrier is not shown on the plan, the following minimum requirements are to be met:

1. Install root barrier where trees are planted within sixty inches (60”) of paving or other hardscape elements, such as walls, curbs, and walkways.

2. Install root barrier continuously for a distance of five feet (5’) in each direction from the tree trunk, for a total distance of ten feet (10’) per tree. If trees are spaced closer, use a single continuous piece of root barrier.

B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Position top of root barrier just below the top of adjacent hardscape element but above finish grade of the soil so that is visible.

D. If there are concrete spoils or overpour that is impeding the root barrier from being installed directly adjacent to the hardscape element, the contractor is to remove the extra concrete in a manner that does not damage the integrity of the hardscape element.

E. Do not distort or bend root barrier during construction activities.

F. Do not install root barrier surrounding the root ball of tree.

3.05 PLANTING

A. Lawn Hydroseeding:

1. Do not begin hydroseeding until finish-grading has been checked by Landscape Architect. If work is rejected due to failure to obtain Landscape Architect’s approval prior to hydroseeding, redo rejected work at no additional cost to Owner.

2. General: Hydroseeding is an artificial planting process which provides vegetation to an area by using a mixture of soil conditioner/fertilizer, seed, binder, and wood fiber mulch. This mixture should be of such character that it will disperse into a uniform slurry when mixed with water in a mechanical mixer.

3. Equipment: Use a standard hydraulic mulching machine with a continuous agitation system that keeps material in uniform suspension throughout mixing and distribution cycles and with a minimum mixing tank capacity of 500 gallons (3,000+ sq. ft. of coverage).

4. Mix per 1,000 square feet:

a.	Lawn Seed	8 lbs.
b.	Starter Fertilizer	25.0 lbs.
c.	Wood Fiber Mulch:	45 lbs.
d.	Soil Binding Agent:	3 oz.
e.	Herbicide:	0.7 oz.

5. Application: Spray the slurry mix, under pressure, uniformly over the soil surface in a one-step operation. Protect adjacent paving, building walls, etc.

6. Clean any overspray from surfaces at end of each day's work.

7. Permit slurry to "set" approximately twenty-four hours (24 hrs.) before watering. Once watering has begun, do not allow newly hydroseeded areas to dry out.

B. Lawn Sod:

1. Cultivate all lawn areas to a depth of six inches (6"). If cultivation does not break lumps, pull a spike-toothed harrow over the area behind the tractor.

2. Give all lawn areas that are to be sodded a smooth finish to prevent pockets. Do not allow any abrupt changes of surface. Prior to installation of sod, roll the grade with a 200-pound water-ballast roller. Request that the lawn grade be inspected and approved by the Landscape Architect prior to sodding to determine its suitability for planting. Obtain such approval prior to commencing sodding operations.

3. Do not take heavy objects (except lawn rollers) over lawn areas after they have been prepared for planting.

4. Completely lay the sod within twelve hours (12 hrs.) of delivery. Do not leave sod on pallets in the hot sun longer than necessary.

5. Unroll sod carefully. Lay sod tight without any visible open joints, and without overlapping; stagger end joints twelve inches (12") minimum. Do not stretch or overlap sod pieces. Do not place sod in pieces smaller than twenty-four inches (24") in length by width of roll.

6. When new sod is to match existing turf, cut the edge of the existing turf in a series of straight lines that will accept new sod rolls in full width of the sod roll. Make the transition of grade between existing turf and new sod to be seamless with no change in elevation.

7. Immediately after laying sod, roll lawn areas with a 200-pound water-ballast roller.

8. Trim sod to conform to lawn shapes designated in Drawings.

9. On slopes of six inches (6”) per foot and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at a maximum of two feet (2’) on center. Drive pegs flush with soil portion of sod.

10. Ensure that finished appearance is that of one continuous lawn.

11. Do not lay whole lawn before watering. When a conveniently large area has been sodded, water lightly to prevent drying. Continue to lay sod and to water until installation is complete.

12. All sod areas must be approved by Landscape Architect.

13. Water the complete lawn surface thoroughly. Moisten soil at least eight inches (8”) deep. Repeat sprinkling at regular intervals to keep sod moist at all times until rooted. After sod is established, decrease frequency and increase amount of water per application as necessary.

C. Trees, Shrubs, and Groundcover:

1. Lay out individual tree and shrub locations and areas for multiple plantings. Stake the locations, outline the areas, and secure the Owner’s Representative's acceptance before beginning the planting work. Make minor adjustments as requested.

2. Scarify root ball prior to planting. Plant in holes twice the diameter of the root ball and to a depth equal to the container’s height. Place the shrub and/or groundcover so the top of the root ball is one inch (1”) higher than the surrounding grade; place the tree so that the crown of the trunk is two inches (2") higher than the surrounding grade. Set container-grown stock in center of pit. In hot weather, pre-wet the pit. When set, place additional backfill around base and sides of root ball. Work each layer to settle backfill and eliminate voids and air pockets. Thoroughly compact lower half of backfill in plant pit. See staking or guying detail. Water after planting. Provide a berm or watering basin for each tree. Add Vitamin B-1, in the proper solution as recommended by the manufacturer, to the second watering of the basin.

3. Place fertilizer planting tablets in root zone and alongside each plant. Follow manufacturer's instructions for number of tablets to use for each container size.

4. See Drawings for additional information.

5. Grooming and Staking of Trees:

   a. Prune, thin-out and shape trees in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by Landscape Architect, do not cut tree leaders, and remove only injured or dead branches from flowering trees.

b. Paint cuts over one-half inch (½") in size with standard tree paint or compound, covering exposed, living tissue. Use paint that is waterproof, antiseptic, adhesive, elastic and free of kerosene, coal tar, creosote, and other substances harmful to plants. Do not use shellac.

c. Stake or guy trees immediately after planting, as indicated on Drawings.

6. Grooming of Shrubs:

a. Prune, thin-out and shape shrubs in accordance with standard horticultural practice. Prune shrubs to retain natural character and to accomplish their use in landscape design. The required plant size is its size after pruning.

b. Remove and replace excessively pruned or malformed new plants resulting from improper pruning.

D. Request review by the Landscape Architect after locating, but prior to planting all trees. Under the direction of the Landscape Architect, make slight adjustments to plant material location as necessary to reflect original intention of Drawings.

3.06 WEED CONTROL

Apply pre-emergent weed control to all planting areas (except lawn) after completion of all planting and one complete watering. Follow manufacturer's directions. To prevent washing away of weed control, do not over-water after its application. Do not allow any weed control into lawn areas. Treat any existing noxious weeds, such as Johnson grass, with Roundup in successive treatments until all roots are destroyed, then remove all grass and roots. Notify Owner's Representative of time of installation for verification of application.

3.07 BARK MULCH

Apply mulch at the rate of three inches (3") deep to all planting areas, exclusive of lawn, after the planting and weed control are completed. Twelve inches (12") from planter edges, taper full depth of mulch to meet adjacent grades. Do not place mulch within three inches (3") of trunk or stems.

3.08 CLEAN-UP

A. During construction, keep the site free of rubbish and debris, and clean up the site promptly when notified to do so. Take care to prevent spillage on streets from hauling and immediately clean up any such spillage and/or debris deposited on streets due to the work of this Section.

B. During all phases of the construction work, take all precautions to abate dust nuisance by clean-up, sweeping, sprinkling with water, or other means as necessary.

3.09 LANDSCAPE MAINTENANCE

A. The Landscape Maintenance Period will begin when all the Landscape Maintenance Period Requirements have been met (See Part 1 of these Specifications).

B. Cleaning: Maintain cleanliness on paving areas and other public areas used by equipment and immediately remove all spillage. Remove from project site all rubbish and debris found thereon and all material and debris resulting from landscaping work, leaving the site in a safe and clean condition.

C. Maintenance:

1. Sprinkler Irrigation System:

a. Check system weekly for proper operation. Flush lateral lines out after removing last sprinkler head or two at each end of lateral. Adjust all heads as necessary for unimpeded coverage.

b. Set and program automatic controllers for seasonal water requirements. Provide the Owner's Representative with keys to the controllers and instructions on how to turn off system in case of emergency.

c. Repair all damages to sprinkler irrigation system as part of the contract work. Make repairs within one watering period or one week, whichever is the least amount of time.

2. Turf Areas:

a. Begin mowing turf when grass has reached a height of three inches (3") and cut to a height of one and one-half inches to two inches (1 ½" - 2"). Mow at least weekly after the first cut. Turf must be well-established and free of bare spots and weeds, to satisfaction of Landscape Architect, prior to final acceptance. Do not mow lawns when the soil is not able to support maintenance equipment. Repair wheel marks and ruts caused by the maintenance equipment at no additional cost to the Owner.

b. Pick up grass clippings and remove from the site and premises.

c. Trim edges at least twice monthly for neat appearance. Vacuum or blow clippings off walks.

d. Water the lawns at such frequency as weather conditions require to replenish soil moisture below the root zone. Normally, a total of one and one-half inches (1 ½") of water is needed weekly in hot weather.

e. Fertilize the lawn areas at the beginning of the Landscape Maintenance Period and at the completion of the Landscape Maintenance Period. Use a fertilizer with the following characteristics:

1.) Slow release, Best 16-6-8, or approved equal, at the rate of 6.25 lbs per 1,000 square feet from March through October.

2.) Calcium Nitrate (15-0-0) at the rate of 6.5 lbs per 1,000 square feet from November through February.

f. Broadcast fertilizer using a mechanical spreader; do not apply by hand-broadcasting. Sweep all fertilizer off hardscape into adjacent planters.

g. Weekly as needed and as directed, re-sod lawn areas with material that matches previously installed material. Use sod to repair any bare areas. Repair areas to receive sod as follows:

1.) Mark out areas to receive new sod repair.

2.) Cut straight lines that will accept sod the full width of the roll and a minimum of twenty-four inches (24”) in length.

3.) Transition the grade between existing turf and new sod seamlessly, with no change in elevation.

3. Trees and Shrubs:

a. Water enough that moisture penetrates throughout root zone and only as frequently as necessary to maintain healthy growth.

b. Construct and/or remove water basins around each plant, depending on the time of the year and as directed.

c. Do not prune unless directed by the Landscape Architect.

d. Re-stake and re-tie trees as needed and as directed by the Landscape Architect. Do not allow tops of tree stakes to protrude into head of tree.

e. Replace any dead, dying or vandalized plant material on a weekly basis throughout the Landscape Maintenance Period.

4. Insecticide and Herbicide Application:

a. If needed, control weeds with selective herbicides and sprays. In areas where crabgrass has infested the lawn, apply pre-emergent herbicides such as Dacthal by Amvac, Balan, or Betasan by Gowan for control prior to crabgrass germination. Control insect pests if necessary.

b. Use only a licensed Pest Control Operator to apply herbicides and sprays and to maintain a log for applications indicating material, timing, and rate.

5. Pre-scheduled On-site Meetings: Hold regularly-scheduled (monthly or bimonthly as determined by the Landscape Architect) on-site meetings with the Landscape Architect, Project Inspector and Owner’s Representative. Dates and times will be jointly agreed upon.

6. Request, forty-eight hours (48 hrs.) in advance, on-site visits by the Landscape Architect to determine the end of the Landscape Maintenance Period.

LANDSCAPING

Section 32 80 00
21-32-051

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 SCOPE OF WORK

A. The work includes, but is not necessarily limited to, the following:

1. Domestic water piping system.
2. Fire protection piping systems.
3. Sewer piping system.

B. Other items that may be specified or shown on the Drawings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 23 33, Trenching and Backfilling.

C. Section 32 16 00, Site Concrete.

D. Section 33 00 00, Earthwork.

1.04 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the drawings to be salvaged and re-used.

1. Sun damaged or discolored PVC pipe will be rejected.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects or deficiencies discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from

inadequate compaction or incorrect grades will be the responsibility of the contractor.

E. Per 2016 NFPA 13 provide Contractor's material and test certificate to the Owner, Architect, Project Inspector and Local Fire Authority.

1.05 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Provide sieve analysis from accredited testing lab on pipe bedding material. Analysis shall have a current date not older than project contract signing date.

D. Substitution: Provide all data of proposed material being submitted as a substitution. Provide comparison with specified product data and identify all differences. Failure to provide comparison will be reason for rejection.

1.06 FEES, PERMITS, AND UTILITY SERVICES

A. Obtain and pay for permits and service charges required for installation of Work. Arrange for required inspections and secure written approvals from authorities having jurisdiction.

B. Upon completion of work within right-of-way, provide copies of written final approval to the Architect.

1.07 WARRANTY

A. Refer to General Conditions and Section 01 78 36.

1.08 REFERENCES AND STANDARDS

A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

E. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

F. CALTRANS Standard Specifications.

G. CAL-OSHA, Title 8, Section 1590 (e).

H. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

I. NFPA 13, 24 and 25, latest editions.

J. California State Health and Safety Code Section 116875, Lead Free Public Water Systems.

K. California Plumbing Code, latest edition.

1.09 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.10 PROJECT CONDITIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

1.11 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.12 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should

damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to provide pumps and all equipment necessary to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

H. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

1.13 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.14 RECORD DRAWINGS

A. Keep a daily record of all pipe placed in ground, verified by Project Inspector.

B. Upon completion of this Contract, furnish one tracing showing all outside utility lines, piping, etc., installed under this Contract. Locate and dimension all work with reference to permanent landmarks.

C. All symbols and designations used in preparing "RECORD" drawings shall match those used in Contract drawings.

D. Properly identify on as-builts and provide dimensions for all stubs for future connections. Provide concrete markers 6" dia. 12" deep, flush with finish grade at the ends of all stubbed pipes.

PART 2 – PRODUCTS

2.01 MATERIALS - GENERAL

A. Provide each item listed herein or shown on drawings of quality noted or approved equal. All material shall be new, full weight, standard in all respects and in first-class condition. Insofar as possible, all materials used shall be of same brand or manufacture throughout for each class of material or equipment. Materials shall be of domestic manufacture and shall be tested within Continental United States.

B. Grade or quality of materials desired is indicated by trade names or catalog numbers stated herein.

C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.

D. All materials in this section used for any public water system or domestic water for human consumption shall be lead free.

1. For the purposes of this section, "lead free" means not more than 0.2 percent lead when used with respect to solder and flux and not more than 8 percent when used with respect to pipes and pipe fittings.
2. All pipe, pipe or plumbing fitting or fixtures, solder, or flux shall be certified by an independent American National Standards Institute (ANSI) accredited third party, including, but not limited to, NSF International, as being in compliance with this section.

E. All materials used for fire system piping shall be UL and FM approved.

2.02 VALVE BOXES

A. Provide at each valve or cock in ground a Christy, Brooks, or equal to Christy G05CT, concrete valve box with cover marked for service, domestic water shall be marked "Water" and fire supply shall be marked "Fire". Furnish extension handles for each size square nut valve, and provide "fork" handle for each size of "wheel handle" valve as required. Do not locate valve boxes in walk, or covered passages, curbs, or curb & gutters, unless necessary. If valve location is within concrete or asphalt paved surface valve box shall be as detailed on plans for such condition. Provide valve box extensions as required to set bottom of valve box to bottom of piping in which valve is installed. Provide Owner with set of special wrenches and/or tools as required for operation of valves.

2.03 PIPES AND FITTINGS

A. Sanitary Sewer: PVC sewer pipe and fittings with Ring-Tite joints, ASTM D3034 SDR35.

B. Domestic water Lines 3 1/2" and smaller: Schedule 80 PVC.

C. Water lines 4" and larger: AWWA C-900 Class 150/DR18 with rubber gasket joints.

D. Fire lines 4" and larger: AWWA C-900 Class 200/DR14 with rubber gasket joints.

E. Solder: Lead Free. 95/5; 95% Tin / 5% Antimony.

F. Ductile Iron Pipe; Class 350, Cement Lined

G. Ductile Iron Pipe Fittings; AWWA C110, C153, Ebba Iron, Star Romac, Sigma, or approved equal.

H. Mechanical Fitting Bolts; Bolts and nuts shall be carbon steel with a minimum 60,000 psi tensile strength conforming to ASTM A 307, Grade A. Bolts shall be standard ANSI B1.1 Class 2A course threads. Nuts shall conform to ASTM A 563 and be standard ANSI B1.1, Class 2A course thread. All bolts and nuts shall be zinc coated.

I. Fasteners Anti-Rust Coatings; After assembly, coat all fasteners with an Asphaltic Bituminous coatings conforming to latest edition NFPA 24.

J. Ductile Iron Pipe Wrap; 8 mil polyethylene pipe wrap conforming to ANSI/AWWA C105/A21.5 standards.

2.04 CLEANOUTS

A. Cleanouts of same diameter as pipe up to 8" in size shall be installed in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 18" from building so as to provide sufficient space for rodding. No horizontal run over 100 feet shall be without cleanout whether shown on drawings or not.

B. All cleanout boxes shall be traffic rated with labeled lid, Christy G05CT or approved equal. Lid shall be vandal proof with stainless steel screws

2.05 UNIONS

A. Furnish and install one union at each threaded or soldered connection to equipment and 2 unions, one on each side of valves on pipes ½" to 3".

B. Locate unions so that piping can be easily disconnected for removal of equipment or

valve. Provide type specified in following schedule:

Type of Pipe Union

Steel Pipe:	150 lb. Screwed malleable ground joint, brass, brass-to-iron seat, black or galvanized to match pipe.
PVC Sch 80 pipe:	PVC union, FIPT X FIPT

2.06 VALVES

A. Provide valves as shown and other valves necessary to segregate branches or units. Furnish valves suitable for service intended. Valves shall be properly packed and lubricated. Valves shall be non-rising stem. Place unions adjacent to each threaded or sweat fitting valve. Install valves with bonnets vertical. All valves shall be lead free.

B. Valves ½" thru 2"; shall be made of bronze, full size of pipe and lead free. Nibco S-113-FL Series; American G-300 Series; Matco 511 FL Series; Apollo 102T-FL Series. Brass valves of brass parts within valves will not be accepted.

C. Valves, 2 ½" thru 3" shall be class 150; Shall be made of bronze, full size of pipe; Jenkins Fig. 2310 J; Lunkinheimer Fig. 2153; Crane Fig. 437; Stockham Fig. B-128.

D. Valves, Flanged; 4" thru 12" Ductile Iron Resilient Wedge Gate Valve; Nibco F 609 RW; American 2500 Series; Kennedy 8561; Mueller 2360 Series.

2.07 FIRE HYDRANTS

A. Per City of Lodi standards and specifications.

2.08 BACKFLOW PREVENTERS
Double Check Valve, Double Check Detector and Reduced Pressure Backflow Preventers

A. Backflow preventers shall be as approved by the local agency and by the State of California's Department of Health Services most recent list of approved reduced pressure backflow preventers. All approved backflow preventers shall have ductile iron bodies.

1. Provide Backflow preventer blankets with locking device. Weatherguard R-30 insulated or equal.
2. Provide ball valve at all test ports with brass plug in valve.
3. Provide a minimum of 2 valve tamper switches on fire prevention Backflows.

2.09 TAPPING SLEEVE

A. Shall be used on pipe sizes 6" thru 12" and shall be made with stainless steel material

including stainless steel bolts. Flanges shall be ductile iron or high carbon steel. Gaskets shall seal full circumference of pipe. Shall be manufactured for operating pressure of 200 psi, and shall pass test pressure of 300 psi. Romac SST series; Smithblair 662; Mueller H304; Ford “FAST” tapping sleeve.

2.10 SERVICE SADDLES

A. Shall be used on pipe size 2” thru 4”. Body shall be made from ductile iron with epoxy coating or bronze. Cascade Style CSC-1; A.Y. McDonald model 3891 AWWA/3892 FNPT; Smith-Blair #317; Ford S70, S71, S90, (style B).

2.11 TRACER WIRE

A. No. 10 THW solid copper wire. Solder all joints

PART 3 - EXECUTION

3.01 DRAWINGS AND COORDINATION

A. General arrangement and location of piping, etc., are shown on Drawings or herein specified. Install work in accord therewith, except for minor changes that may be necessary on account of other work or existing conditions. Before excavation, carefully examine other work that may conflict with this work. Install this work in harmony with other craft and at proper time to avoid delay of work.

B. Verify invert elevations at points of connection to existing systems prior to any excavation. If invert elevations differ from that shown on drawings, notify Architect immediately.

C. In advance of construction, work out minor changes if conflicts occur with electrical or mechanical. Relocate services to suit actual conditions and work of other trades to avoid conflict therewith. Any adjustments or additional fittings to make adjustments shall not be cause for additional costs to the owner.

D. Execute any work or apparatus shown on drawings and not mentioned in specifications, or vice versa. Omission from Drawings or Specifications of any minor details of construction, installation, materials, or essential specialties does not relieve Contractor of furnishing same in place complete.

E. Graded pipes shall take precedence. If conflict should occur while placing the domestic water and fire service piping, the contractor shall provide any and all fittings necessary to route the water lines over or under such conflicting pipes at no additional costs to the owner.

3.02 ACCESS

A. Continuously check for clearance and accessibility of equipment or materials specified herein to be placed. No allowance of any kind shall be made for negligence on part of Contractor to foresee means of installing his equipment or materials into proper position.

3.03 EXCAVATING AND BACKFILLING

A. Excavation and Bedding:

1. General: Trench straight and true to line and grade with bottom smooth and free of irregularities or rock points. Trench width to be a minimum of 12" wider than outside diameter of pipe. Follow manufacturer's recommendations for use of each kind and type of pipe.
2. Bedding: Provide a bedding as noted on drawing details for the full length of the pipe. Bedding shall have a minimum thickness beneath the pipe of 4" or 1/8 the outside diameter of the pipe, which ever is greater. Provide bell holes and depressions for pipe joints only of size required to properly make joint.

B. Laying of Pipe:

1. General: Inspect pipe prior to placing. Sun damaged pipe will be rejected. Set aside any defective or damaged material. Do not place pipe in water nor place pipe when trenches or weather are unsuitable. Lay pipe bell upgrade, true to line and grade.

    a. Sewer pipe shall be laid in strict conformity to the prescribed line and grade, with grade bars set and each pipe length checked to the grade line. Three consecutive points on the same rate of slope shall be used at all times to detect any variation from a straight grade. In any case of discrepancy, work shall be stopped and the discrepancy immediately reported to the Owner’s Representatives. In addition, when requested by the Owner's Representative, a string line shall be used in the bottom of the trench to insure a straight alignment of the sewer pipe between manholes. The maximum deviation from grade shall not be in excess of 1/4 inch. In returning the pipe to grade, no more than ¼” depression shall result.
    b. The Contractor shall expose the end of existing pipe to be extended, for verification of alignment and elevation, prior to trenching for any pipe which may be affected. All costs of such excavation and backfill shall be included in the price paid for the various items of work.
    c. A temporary plug, mechanical type shall be installed on sewer pipe at the point of connection to existing facilities. If connecting to a public facility the plug shall conform to the requirements of the local jurisdiction. This plug shall remain in place until the completion of the balling and flushing operation.

2. Bell and Spigot Joints: Lubricate inside of bells and outside of spigots with soap solution. Wedge joints tight. Bell of bell and spigot pipe to be pointed upgrade.

C. Backfilling:

1. General: Do not start backfill operations until required testing has been accomplished.
2. Compaction and Grading: Remainder of backfill shall be in accordance with Section 31 23 33 – TRENCHING AND BACKFILLING.

3.04 INSTALLATION OF WATER PIPING

A. The contractor shall be responsible for determining the installed depth of all water piping, based on surfaces grades and minimum required depth of cover.

B. Immediately cap or plug ends of, and opening in, pipe and fittings to exclude dirt until final connections made. Use reducing fittings where any change in pipe size occurs. Bushings shall not be used.

C. General: Should existing conditions or other work prevent the running of pipes or the setting of equipment at the points indicated by drawings, changes as authorized by the Architect shall be made without additional cost to the Owner.

D. All bolts used on mechanical fittings shall be thoroughly coated with an asphaltic bituminous coating conforming to 2016 NFPA 24, 10.4.1.1.

E. All buried metal shall be incased with 8 mil polyethylene wrap so that no soil is in contact with metal. Ends of polyethylene wrap shall be taped to provide seal with pipe.

F. Do not install water lines in same trench with non-metallic sewer lines unless bottom of water pipe at all points is at least 12" above top of sewer line and water line is placed on solid shelf excavated at one side of common trench with a minimum of 12 inch horizontal separation.

G. Under no circumstance shall a fitting be located directly under a structural footing without prior approval from the Architect.

H. In locations where existing domestic pipe is rerouted, the new pipe shall be assembled using restrained fittings at all joints including factory pipe joints. Tapped restrained blind flanges shall be temporarily installed at each end of the assembled pipes until testing and chlorination is completed and approved.

3.05 CLOSING IN OF UNINSPECTED WORK

A. Do not allow or cause work installed to be covered up or enclosed before it has been

inspected, tested, and approved. Should work be enclosed or covered up before it has been approved, uncover work at own expense. After it has been inspected, tested and approved, make repairs necessary to restore work of other contractors to condition in which it was found at time of cutting.

3.06 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in new condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures and trim that are installed as part of this work. Leave systems and equipment in satisfactory new operating condition.

B. Drain and flush piping to remove grease and foreign matter.

C. Sewer piping shall be balled and flushed.

D. Clean out and remove surplus materials and debris resulting from the work, including surplus excavated material.

E. Flush fire service piping 3 times in the presence of the project inspector. Each flushing shall be 3 minutes minimum.

3.07 SEWER INTERNAL INSPECTIONS

A. Upon completion of construction and prior to final inspection, the Contractor shall clean the entire new pipeline of all dirt and debris. Any dirt or debris in previously existing pipes or ditches in the area, which resulted from the new installation, shall also be removed. Pipes shall be cleaned by the controlled balling and flushing method. Temporary plugs shall be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility.

3.08 TEST OF PIPING

A. Pressure Test piping at completion of roughing-in, in accord with following schedule, and show no loss in pressure or visible leaks after minimum duration or four (4) hours at test pressures indicated.

B. Chlorination tests shall be performed after all fixtures and any required mechanical devices are installed and the entire system is complete and closed up.

C. In cases where new domestic water piping is assembled for re-routing of existing domestic water pipe, the contractor shall perform the following testing prior to connecting the new water pipe to the existing system.

1. The pipe shall be pressure tested and per the test schedule.

2. The pipe shall be pressure tested down within the trench.
3. The contractor shall dig a temporary ditch below the existing pipe to drain to a sump that is lower than the bottom of the trench and to the side of the trench. The sump shall be 30% larger than the total volume of water within the testing pipe assembly.
4. After pressure testing and chlorination has taken place and accepted, the contractor shall drain the pipe into the sump and pump the sump out as it is filling.
5. The temporary test fittings at each end of the pipe assembly shall be removed and the final restrained couplings installed.
6. The existing piping shall be cut and the water within the pipe shall drain below the pipe to the temporary sump. Pump the sump as it is being filled up. Take extreme caution not to contaminate the existing pipe with any contaminates within the trench.
7. Before making the final coupling connections, the restrained couplings at each end of the new pipe shall be thoroughly swabbed inside the fitting with a solution of chlorine mixed with water at a rate of 1part chlorine to 4 parts potable water.
8. After final connections are made, a visual inspection shall be made after fittings are wiped off. If after 1 hour, no noticeable drips are noted the pipe can be backfilled.
9. The contractor shall flush all water piping affected by chlorination until it is within acceptable levels approved by certified testing lab.

TEST SCHEDULE

System Tested	Test Pressure PSIG Test With
Public water mains	Per local jurisdiction requirements.
Private domestic water piping and fire mains serving fire hydrants:	150 Lbs. Water 4 hrs.
Fire Protection Piping from PIV to fire riser:	200 Lbs. Water pressure, 4 hrs duration with no pressure loss.
Sanitary Sewer Piping:	Sewer system shall be tested for leakage per local jurisdiction requirements.

D. Testing equipment, materials, and labor shall be furnished by contractor.

3.09 WATER SYSTEM STERILIZATION

A. Public Water Mains: Shall be flushed and disinfected per the local jurisdiction requirements

B. Clean and disinfect all site water systems connected to the domestic water systems in accordance with AWWA Standard C651 and as required by the local Building and Health Department Codes, and EPA.

1. Clean and disinfect industrial water system in addition to the domestic water system.
2. Disinfect existing piping systems as required to provide continuous disinfection upstream to existing valves. At Contractors option, valves may be provided to isolate the existing piping system from the new piping system.

C. Domestic water sterilization shall be performed by a licensed “qualified applicator” as required by CAL-EPA Pesticide Enforcement Branch for disinfecting and sterilizing drinking water.

D. Disinfecting Agent: Chlorine product that is a registered product with Cal-EPA for use in California potable water lines, such as Bacticide, CAL-EPA Registration No. 37982-20001.

E. Contractor to provide a 1” service valve connected to the system at a point within 2’-0” of its junction with the water supply line. After sterilization is complete Contractor to provide cap at valve.

F. Sterilization Procedure to be as follows:

1. Flush pipe system by opening all outlets and letting water flow through the system until clear water flows from all outlets.
2. Inject disinfecting agent to provide a minimum chlorine residual concentration of at least 50 parts per million (ppm) of free chlorine at each outlet.
3. Provide sign at all outlets which reads “Water Sterilization in Progress – Do not operate”. Remove signs at conclusion of test.
4. Close all outlets and valves, including valve connecting to water supply line and 1” service valve. Retain treated water in pipe for a minimum of twenty-four hours. Should chlorine residual at pipe extremities be less than 50 PPM at this time, pipe shall be re-chlorinated. As an option, the water systems may be filled with a water-chlorine solution containing a minimum of 200 PPM of chlorine and allowed to stand for three hours.
5. After chlorination, flush lines of chlorinated water and refill from domestic supply. Continue flushing until residual chlorine is less than or equal to 0.2 ppm, or a residual the same as that of the test water.

G. Chemical and bacteriological tests shall be conducted by a state-certified laboratory and approved by the local authorities having jurisdiction.

H. Submit written report to Health Department as required by State Regulations. Provide a copy of report to Architect prior to completion of project.

I. The costs of sterilization and laboratory testing shall be paid for by the contractor.

3.10 CLEANING

A. Refer to Section 01 74 00.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

END OF SECTION

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 23 33, Trenching and Backfilling.

C. Section 32 12 00, Asphalt Concrete Paving.

D. Section 32 16 00, Site Concrete

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.05 WARRANTY

A. Refer to General Conditions.

1.06 REFERENCES AND STANDARDS

A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

E. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

F. CALTRANS Standard Specifications.

G. CAL-OSHA, Title 8, Section 1590 (e).

H. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

I. California Plumbing Code 2019 edition.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

1.09 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting

will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and/or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to provide pumps and all equipment necessary to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

H. Trees: Carefully protect existing trees that are to remain.

1.11 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.12 TESTING

A. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.

1.13 RECORD DRAWINGS

A. Keep a daily record of all pipe placed in ground, verified by Project Inspector.

B. Upon completion of this Contract, furnish one tracing showing all outside utility lines, piping, etc., installed under this Contract. Locate and dimension all work with reference to permanent landmarks.

C. All symbols and designations used in preparing "RECORD" drawings shall match those used in Contract drawings.

D. Properly identify all stubs for future connections, as to location and use, by setting of concrete marker at finished grade in the manner suitable to Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe: Use one of the following, unless noted on the Drawings otherwise.

1. Polyvinyl Chloride Pipe (PVC): SDR35 conforming to ASTM D3034 with elastomeric joints conforming to ASTM D3212. Sun damaged pipe will be rejected.
2. High density polyethylene pipe (HDPE): The pipe shall be corrugated exterior/smooth interior pipe and water tight per ASTM D3212 with dual wall water tight gasket fittings.

B. Perforated Pipe (for subdrains): Shall be ADS N12 pipe, 3 hole, ASTM F 405, AASHTO M 252; PVC ASTM D3034 SDR-35 storm drain pipe

C. Drop Inlet: Shall be as shown on the drawing details.

D. Mortar: For pipe connections to concrete drainage structures, conform to ASTM C270 type N mortar. Place within one half hour after adding water.

E. Crushed Rock: Imported washed crushed rock. Minimum 100% passing 3/4 inch sieve.

F. Area Drains: Shall be as shown on the drawing details.

G. Clean-outs: Shall be as shown on the drawing details.

H. Filter Fabric: Mirafi 140N.

PART 3 - EXECUTION

3.01 INSPECTION LAYOUT AND PREPARATION

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point were this installation may properly commence

B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.

C. Verify that specified items may be installed in accordance with the approved design.

D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 INSTALLATION

A. General: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified.

B. Verify invert elevations at points of connection to existing systems prior to any excavation. If invert elevations differ from that shown on drawings, notify Architect immediately.

C. Excavation and Bedding:

1. General: Trench straight and true to line and grade with bottom smooth and free of irregularities or rock points. Trench width in accordance with pipe manufacturer's recommendations and as per the drawings. Follow manufacturer's recommendations for use of each kind and type of pipe.
2. Bedding: Provide bedding as detailed on plans for the full length of the pipe. Bedding shall have a minimum thickness beneath the pipe of 4" or 1/8 the outside diameter of the pipe, which ever is greater. Provide bell holes and depressions for pipe joints only of size required to properly make joint.
3. If the trenches for the site drainage fall within areas to be lime treated, the piping shall be installed prior to any lime treatment operations.

D. Laying of Pipe:

1. General: Inspect pipe prior to placing. Set aside any defective or damaged material. Do not place pipe in water nor place pipe when trenches or weather are unsuitable. Lay pipe upgrade, true to line and grade.
2. Bell and Spigot Joints: Lubricate inside of bells and outside of spigots with soap solution or as recommended by manufacture. Wedge joints tight. Bell of bell and spigot pipe to be pointed upgrade.
3. Pipe shall be bedded uniformly throughout its length.
4. Pipe elevation shall be within 0.02 feet of design elevation as shown on plans.
5. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the governing agency.

E. Backfilling:

1. General: Do not start backfill operations until required testing has been

accomplished.

2. Trenches and Excavations: Backfill with material as detailed on plans, filling both sides of the pipe at the same time, carefully tamping to hold pipe in place without movement. Refer to Section 31 23 33 – TRENCHING AND BACKFILLING for fill above this layer.

F. Grouting of Pipes: Grout pipes smooth and water tight at drop inlet, manholes, and curb inlets. Grout back side of hood at curb inlets all grouting shall be smooth and consistent.

G. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the local agency.

H. Cutting and Patching: Remove and replace existing surface features per applicable specification section (i.e. asphaltic concrete or concrete paving) where pipe is installed in areas of existing improvements.

3.03 TOLERANCES

A. Storm Drain structure grates

1. In landscape and lawn areas +- 0.05'.
2. In sidewalk and asphalt pavement +-0.025'.
3. In curb and gutter application +-0.0125'.

B. Cleanout Boxes and Lids

1. In landscape areas; 0.10 higher than surrounding finish grade, +-0.05'.
2. In sidewalks and asphalt pavement; Flush with surrounding finish grade, +-0.025'.

3.03 DEWATERING

A. Contractor to provide trench dewatering as necessary, no matter what the source is, at no additional cost to the owner.

B. If the previously excavated material from trenching is too wet to achieve trench backfill compaction the contractor shall make a reasonable effort to aerate and dry the material per section 31 00 00, 3.08, B

3.04 FLUSHING

A. The Contractor shall thoroughly ball and flush the storm drain system to remove all dirt and debris. Discharge water to an approved location.

3.05 CLEANING

A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

B. Clean the dirt, rocks, and debris from all storm drain inlets, structures, and connecting pipes.

END OF SECTION

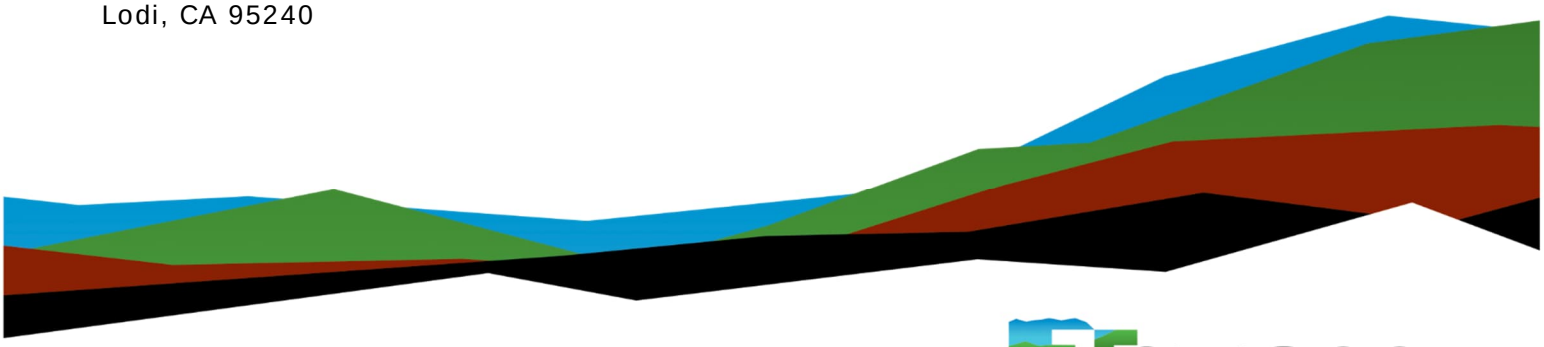
Pre-Renovation Hazardous Materials Survey

Lodi Middle School - 945 S Ham Lane, Lodi, CA
Building F Student Restrooms and Hardscape

October 2, 2024 | Report Number: NA245056_7122

Prepared for:

Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240



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October 2, 2024

Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240

Attn: Ms. Edith Holbert
T: 209-331-7121

RE: Pre-Renovation Hazardous Materials Survey
Lodi Middle School - 945 S. Ham Lane, Lodi, California
Building F Student Restrooms and Hardscape
Terracon Task Order No: NA245056_7122

Dear Ms. Holbert:

Terracon Consultants, Inc. (Terracon) is pleased to submit the attached report for the referenced site to Lodi Unified School District. The purpose of this report is to present the results of the pre-renovation hazardous materials survey performed on September 23, 2024. This survey was conducted in general accordance with Terracon's Task Order # PNA245056_7122, dated September 23, 2024. We understand that this survey was requested due to the planned renovation of the restrooms at Building F and surrounding hardscape at the Lodi Middle School campus located at 945 S. Ham Lane in Lodi, California.

Terracon collected forty-seven (47) samples from fourteen (14) homogeneous areas of suspect ACMs. Asbestos content was confirmed in three (3) of the materials identified, sampled, and analyzed. Five (5) painted surfaces and one (1) other building material suspected to contain lead were sampled and analyzed. Four (4) of the paints and the bulk sample were found to contain detectable levels of lead. Two (2) building envelope sealants were collected and analyzed for potential PCB content. PCBs were not detected in either sample. Other hazardous building materials present include mercury containing fluorescent light tubes and suspect PCB lighting ballasts. Please refer to the attached report for details.

Terracon appreciates the opportunity to provide this service to Lodi Unified School District. If you have any questions regarding this report, please contact our office at your convenience.

Sincerely,
Terracon Consultants, Inc.

Denise L. Wallen

Denise Wallen, SST
Project Manager

Steffen Steiner

Steffen Steiner, CAC, CDPH Lead I/A
Office Manager

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Project Objective 1
1.2 Reliance 1
2.0 BUILDING DESCRIPTIONS 2
3.0 FIELD ACTIVITIES 2
3.1 Asbestos, Lead, PCBs, and Other Hazardous Building Materials 2
3.2 Visual Assessment - Asbestos 2
3.3 Physical Assessment - Asbestos 2
3.4 Sample Analysis - Asbestos 3
3.5 Lead Containing Paint and Bulk Materials 3
3.6 Visual Assessment – Lead Containing Paint and Bulk Materials 3
3.7 Physical Assessment – Lead Containing Paint and Bulk Materials 3
3.8 Sample Analysis - Lead Containing Paint and Bulk Materials 3
3.9 PCBs – Sealants 4
3.10 Visual Assessment - Other Hazardous Building Materials 4
4.0 REGULATORY OVERVIEW 4
4.1 Asbestos 4
4.2 Lead Containing Paint/Materials 4
4.3 Refrigerants 6
4.4 Universal Waste 6
4.5 PCBs 6
5.0 FINDINGS 7
5.1 Asbestos 7
5.2 Lead Containing Paint/Materials 7
5.3 PCB Containing Materials 8
5.4 Other Hazardous Building Materials 8
6.0 LIMITATIONS/GENERAL COMMENTS 9

APPENDIX A ASBESTOS SAMPLE SUMMARY
APPENDIX B ASBESTOS ANALYTICAL LABORATORY DATA
APPENDIX C LEAD ANALYTICAL LABORATORY DATA
APPENDIX D PCB ANALYTICAL LABORATORY DATA
APPENDIX E SAMPLE AND MATERIAL LOCATION FIGURES
APPENDIX F CERTIFICATIONS

PRE-RENOVATION HAZARDOUS MATERIALS SURVEY

Lodi Middle School - 945 S. Ham Lane, Lodi, California
Building F Student Restrooms and Hardscape

Terracon Task Order No. NA245056_7122
October 2, 2024

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) conducted a limited pre-renovation hazardous materials survey of the Lodi Middle School, Building F Student Restrooms and surrounding hardscape at 945 S. Ham Lane in Lodi, California (Site). The survey was conducted on September 23, 2024 in general accordance with Terracon's Task Order #PNA245056_7122, dated September 23, 2024, and the asbestos sampling protocols established in Environmental Protection Agency (EPA) regulation 40 Code of Regulations (CFR) Part 763 Subpart E 763.86 (Asbestos Hazard Emergency Response Act, AHERA). Sample collection of suspect asbestos-containing materials (ACMs), lead containing paints (LCPs) and materials, and polychlorinated biphenyls (PCBs) materials was completed on the interior and exterior of the site. Other hazardous building materials were noted, if observed.

1.1 Project Objective

The objective of this survey was to identify the presence or absence of suspect ACMs and lead containing paints and materials, PCBs in materials (light ballasts, and building enclosure sealants), universal waste (fluorescent light tubes, mercury containing switches, batteries, electronics), tritium (radioactive) emergency egress equipment, and regulated refrigerants in mechanical or building equipment likely to be impacted by the planned renovation as detailed in the provided architectural drawings, *Modernization Lodi Middle School 945 S Ham Lane Lodi, CA* dated February 23, 2023. This survey scope included destructive sampling techniques on the interior and exterior of the survey area.

Based on provided plans, Terracon understands the proposed scope of work currently includes:

- Modernization of Restrooms at Building F.
- Removal and replacement of walkways around classrooms as indicated on provided plans.
- Undercutting of doors and installation of new door bottoms and thresholds.
- Sealing of the brick veneer finish at all building exteriors.

EPA regulation 40 CFR 61, Subpart M, the National Emission Standards for Hazardous Air Pollutants (NESHAP) prohibits the release of asbestos fibers to the atmosphere during renovation or demolition activities. The asbestos NESHAP requires that regulated ACM be identified, classified, and quantified prior to planned disturbances, renovations, or demolition activities.

1.2 Reliance

This report is for the exclusive use of Lodi Unified School District for the Renovation of the Lodi Middle School Building F and Hardscape in Lodi, California. Reliance by any other party on this report is prohibited without written authorization of Terracon and Lodi Unified School District. Reliance on this report by Lodi Unified School District and all authorized parties will be subject to the terms, conditions, and limitations stated in the proposal, this report, and the project contract.

2.0 BUILDING DESCRIPTIONS

The student restrooms are located at the west end of a single-story concrete structure used for classrooms. Typical interior finishes in the student restrooms include drywall walls and ceilings, wainscot and vinyl wall covering, ceramic wall tile, rubber cove base, and concrete floors. Exterior finishes of the structure were a combination of brick and stucco. The survey scope included the concrete walkways around and through the campus.

3.0 FIELD ACTIVITIES

3.1 Asbestos, Lead, PCBs, and Other Hazardous Building Materials

The survey was conducted by Mike Reed, California Division of Occupational Safety and Health (Cal/OSHA) Certified Site Surveillance Technician (CSST) and California Department of Public Health (CDPH) Lead Sampling Technician. Steff Steiner, Cal/OSHA Certified Asbestos Consultant (CAC) and CDPH Lead Inspector/Assessor, oversaw the field survey and preparation of report. Copies of pertinent training certifications are included in Appendix F. The asbestos portion of the survey was conducted in general accordance with the sample collection protocols established in EPA 40 CFR Part 763 Subpart E 763.86, AHERA. A summary of survey activities is provided below.

3.2 Visual Assessment - Asbestos

Survey activities were initiated with visual observation of the subject structure to identify homogeneous areas of suspect ACM. A homogeneous area (HA) consists of a building material that appears similar throughout in terms of color, size, and texture with consideration given to the date of application. Assessment was conducted in all accessible areas of the student restrooms including the interior and exterior.

3.3 Physical Assessment - Asbestos

A physical assessment of each HA of suspect ACM was conducted to assess the current friability and condition of the materials. A friable material is defined by the EPA as a material which can be crumbled, pulverized or reduced to powder by hand pressure when dry. Friability was assessed by physically touching suspect materials.

Based on results of the visual observation, bulk samples of suspect ACM were collected in general accordance with EPA AHERA sampling protocols. Samples of suspect materials were collected from representative locations in each homogeneous area. Bulk samples were collected using wet methods as applicable to reduce the potential for fiber release. Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker.

The selection of sample locations and frequency of sampling were based on Terracon's observations and the assumption that like materials in the same area are homogeneous in content.

Terracon collected forty-seven (47) samples from fourteen (14) homogeneous areas of suspect ACMs. Laboratory analysis reported that three (3) of the materials sampled contain asbestos. The three restroom doors are fire rated and the insulation in the doors is a suspect ACM, therefore, they must be assumed to be ACM. A summary of the materials reported or assumed as containing asbestos is included in Table I below and a summary of all suspect ACM samples collected during the survey is included as Appendix A.

3.4 Sample Analysis - Asbestos

Asbestos bulk samples were submitted under chain of custody to Eurofins EPK Built Environment Testing, LLC (Eurofins) in Tustin, California for analysis by polarized light microscopy (PLM) with dispersion staining techniques per EPA methodology 600/R-93/116. The percentage of asbestos, where applicable, was determined by microscopic visual estimation. Eurofins is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) Accreditation No. 200757-0 (Tustin).

Samples reported with asbestos content by PLM analysis associated with drywall systems were additionally analyzed by point count methodology to potentially reduce regulatory fees and enable flexibility during removal and disposal. Point counting is a process of more precisely quantifying the asbestos content in bulk samples that contain small amounts of asbestos. The laboratory reports for the asbestos bulk samples are included as Appendix B.

3.5 Lead Containing Paint and Bulk Materials

Terracon collected paint chip samples to determine the lead content in parts per million (ppm) of the predominant painted interior and exterior surfaces throughout the student restrooms. In addition, suspect lead containing ceramic tiles were sampled to determine potential lead content. Suspect lead paint and bulk material samples were collected in sealable containers and labeled with unique sample numbers using an indelible marker.

3.6 Visual Assessment – Lead Containing Paint and Bulk Materials

Inspection activities began with visual observations of painted surfaces to identify unique combinations of paint. A unique combination of paint consists of paint that is applied to a building material and has similar color, substrate and component. Assessment was conducted throughout the visually accessible areas of the restrooms. Suspect lead containing materials associated with the concrete walkways were not observed.

3.7 Physical Assessment – Lead Containing Paint and Bulk Materials

A physical assessment of unique combinations of paint was conducted to assess the condition of the paint. Lead paint chip samples were collected to comply with Cal-OSHA regulations (Title 8 CCR 1532.1 – Lead Exposure in Construction) for the proposed Renovation activities. Paint was sampled to identify potential worker exposure and potential disposal restrictions. All interior painted surfaces were in fair to good condition and generally intact with the building substrates at the time of the survey.

Terracon sampled six (6) painted surfaces and bulk materials during the survey. Five (5) of the paint or materials sampled were found to contain lead concentrations in exceedance of the laboratory detection limit. A summary of suspect paint and bulk samples collected during the survey is summarized in Table II.

3.8 Sample Analysis - Lead Containing Paint and Bulk Materials

Paint chip and bulk material samples were submitted under chain of custody to Eurofins in Tustin, California. Paint chip and material samples were analyzed by Flame Atomic Absorption method SW846-7000B. Eurofins are accredited by the American Industry Hygiene Association's (AIHA) Environmental Lead Laboratory Accreditation Program (ELLAP) (Laboratory Code 178697) to perform Flame Atomic Absorption analysis. The laboratory reports for the lead paint and bulk samples are included as Appendix C.

3.9 PCBs – Sealants

Sealants associated with the building enclosure including windows, doors, and other architectural features were assessed for potential PCB content. Bulk sealant samples were collected using a razor knife and were placed into individual containers. Each sample was provided a discrete sample number, which was recorded on a chain of custody form. The samples were preserved on ice and transported under chain of custody procedures to SGS Built Environment of Rocklin, California. All samples were analyzed for PCB content in accordance with EPA Method SW8082.

Two (2) building envelope sealants were collected and analyzed for potential PCB content. PCBs were not detected in either sample. A summary of the PCB sealants collected is included in Table III.

3.10 Visual Assessment - Other Hazardous Building Materials

The site was visually surveyed for the presence of PCBs in light ballasts, universal waste (fluorescent light tubes, mercury containing switches, batteries, electronics), tritium (radioactive) emergency egress equipment, and regulated refrigerants in mechanical or building equipment. All materials were visually assessed and quantified if present. No testing was performed.

4.0 REGULATORY OVERVIEW

4.1 Asbestos

The Asbestos NESHAP program in California is enforced by federal, state, and county Asbestos NESHAP Coordinators. For projects occurring in Fresno, California, the San Joaquin Valley Air Pollution Control District (SJVAPCD) governs renovation and demolition projects has been delegated authority from the EPA to enforce the Asbestos NESHAP within its respective jurisdictional boundaries, excluding tribal lands.

The asbestos NESHAP (40 CFR Part 61, Subpart M) regulates asbestos fiber emissions and asbestos waste disposal practices. The asbestos NESHAP regulation also requires the identification and classification of existing ACM according to friability prior to demolition or renovation activity. Friable ACM is a material containing more than 1% asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. All friable ACM is considered regulated asbestos-containing material (RACM). The NESHAP regulation is implemented locally by the SJVAPCD under Rule 4002.

The asbestos NESHAP regulation classifies ACM as either RACM, Category I non-friable ACM or Category II non-friable ACM. RACM includes all friable ACM, along with Category I and Category II non-friable ACM that has become friable, will be or has been subjected to sanding, grinding, cutting, or abrading, or ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder during renovation or demolition activity. Category I non-friable ACM are exclusively asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products that contain more than 1% asbestos. Category II non-friable ACM are all other non-friable materials other than Category I non-friable ACM that contain more than 1% asbestos.

Friable ACM, along with Category I and Category II non-friable ACM, which is in poor condition and has become friable or which will be subjected to drilling, sanding, grinding, cutting, abrading and which could be crushed or pulverized during anticipated renovation or demolition activities are considered regulated ACM (RACM).

Building materials confirmed to be ACM through the collection of bulk sampling and subsequent laboratory analysis, or presumed ACM, must be removed prior to intentional disturbance during the planned renovation activities. Asbestos abatement must be conducted by California licensed and registered abatement contractors and workers with Cal/OSHA-accredited training. Third-party air monitoring is recommended during the abatement activities.

Cal/OSHA requires that only properly licensed and certified asbestos abatement contractors are allowed to remove ACM. As per NESHAP, all RACM shall be removed from a facility being demolished or renovated before any non-burning demolition or renovation begins that would break up, dislodge, or similarly disturb the material or preclude access to the material for subsequent removal. According to NESHAP, if more than 160 square feet or 260 linear feet of any RACM is to be stripped, removed, dislodged, cut, drilled, or similarly disturbed, or for any demolition, the asbestos abatement contractor or facility owner must submit an Asbestos Notification of Demolition and Renovation form to NESHAP along with the appropriate fees within at least 10 working days prior to the scheduled asbestos removal activity or demolition start date. Planned renovations that do not meet the definition of 'demolition or renovation of a facility' per NESHAP and where no ACM exists do not require notification to NESHAP.

The California Department of Occupational Safety and Health (DOSH) asbestos standard for construction (Title 8 CCR 1529) regulates workplace exposure to asbestos. The DOSH standard requires that employee exposure to airborne asbestos must not exceed 0.1 fibers per cubic centimeter of air (0.1 f/cc) as an eight-hour time weighted average (TWA) and not exceed 1.0 fibers per cubic centimeter of air (1.0 f/cc) over a 30-minute time period known as an excursion limit (EL). The TWA and EL are known as DOSH's asbestos permissible exposure limits (PELs). The DOSH standard classifies construction and maintenance activities which could disturb ACM and specifies work practices and precautions which employers must follow when engaging in each class of regulated work.

Asbestos containing construction materials (ACCM) is a term developed by Cal/OSHA out of concern for non-hazardous building materials used inside and outside a building that contain less than 1% asbestos. The definition of ACCM includes any manufactured building material that has more than one-tenth of 1% (>0.1%) asbestos content. The SJVAPCD requires point counting of friable samples of ACM at concentrations of less than 10% to determine more accurately determine the content of asbestos and proper classification of the material for proper abatement and disposal requirements. Alternatively, materials may be presumed as ACMs. If the material is less than one tenth of 1%, the material is not regulated by the EPA however Cal/OSHA worker protection regulations apply if any asbestos is detected.

4.2 Lead Containing Paint/Materials

Personnel performing demolition activities that may disturb painted components or materials with concentrations of lead above the designated analytical detection limit should comply with all current Cal-OSHA regulations in order to minimize employee exposure. Cal-OSHA defines lead containing paint as a paint, which contains lead, regardless of the concentration. Currently, any proposed renovation/demolition is subject to the Cal-OSHA regulations (Title 8 CCR 1532.1 – Lead Exposure in Construction). The Cal-OSHA regulation defines specific training requirements, engineering controls and working practices for construction personnel subject to this standard. Occupational exposure to lead occurring during construction work, including maintenance activities, painting, alteration and repairs is subject to the Cal-OSHA Lead Exposure in Construction standard.

Construction work covered by Title 8 CCR 1532.1 includes any repair or renovation activities or other activities that disturb in-place lead-containing materials. Employers must assure that no employee will be exposed to lead at concentrations greater than 50 micrograms per cubic meter ($\mu g/m^3$) averaged over an eight-hour period without adequate protection. The Cal-OSHA Standard also establishes an action level of 30 $\mu g/m^3$ which if exceeded triggers the requirement for medical monitoring.

Proper waste stream categorization is required for the disposal of all lead containing materials and painted construction debris with total lead content that exceeds 50 ppm. The debris should be classified as hazardous waste if lead waste concentrations exceed either the total lead concentration or soluble lead concentration regulatory limits. Total lead concentration is determined by Total Threshold Limit Concentration (TTLC). Soluble or leachable lead is determined by the Soluble Threshold Limit Concentration (STLC, California required test) and/or Toxicity Characteristic Leaching Procedure (TCLP) (Federal EPA required test). Regulatory limits characterize a lead waste as a hazardous waste if lead concentrations exceed 1,000 ppm by TTLC or 5 milligram per liter by STLC or TCLP.

The above overview is not intended to be inclusive of all potentially pertinent regulatory information. The relevant EPA and OSHA standards should be consulted prior to undertaking activities involving the demolition, renovation, or maintenance of surfaces coated with lead containing paints.

4.3 Refrigerants

The use, management, and release of ozone depleting substances used as refrigerants are regulated under the Clean Air Act (CAA) of 1990. Section 608 of the CAA forbids the venting of regulated refrigerants such as chlorofluorocarbon (CFC), hydrochlorofluorocarbon (HCFC), and blended refrigerants. All regulated refrigerants associated with the building and equipment must be recovered prior to severing pressurized systems or disposal of equipment.

4.4 Universal Waste

Universal wastes are common wastes with hazardous properties that must be managed and have landfill disposal restrictions. Example of universal waste include electronic devices, batteries, and mercury containing equipment or lighting. Handling, transportation, and disposal is simplified under the universal waste regulation in the California Code of Regulations Title 22, Division 4.5 Chapter 11. All materials in the building meeting the definition of the universal waste must be removed prior to demolition and handled, transported and disposed through an appropriate vendor.

4.5 PCBs

PCBs are regulated by the EPA under 40 CFR 761. The production of PCBs has been banned since 1979 and may be present in electrical capacitors, sealants, hydraulic oils, and transformers commonly found in buildings. Materials with greater than 50 ppm PCB content are considered PCB contaminated waste while materials with greater than 500 ppm PCB are considered PCB containing.

PCB containing equipment and/or contaminated materials must be removed and disposed properly prior to demolition of a building. PCB containing lighting ballasts may be present in some lighting fixtures and must be verified by labeling. All PCB containing materials must be removed and disposed prior to building demolition.

5.0 FINDINGS

5.1 Asbestos

Asbestos was identified or assumed in the building materials listed in Table I below. A complete sample summary is included as Appendix A. Laboratory analytical reports are included as Appendix B. Sample and material locations are depicted on figures in Appendix E.

Table I
Confirmed or Assumed - Asbestos Containing Materials

HM # / Material Description	Material Location	Asbestos Content by layer	NESHAP Category	Est. Qty.
HM 09 / Off-white Exterior Sealant - Brick to Stucco	At Entry to each Restroom	Off-white Sealant: 2% CH	Cat. II	300 sf
HM 13 / 4" Light Yellow Ceramic Wall Tile with Grout and Mortar	Boys' and Girls' Restrooms	Yellow Ceramic Tile: ND Dark Gray Mortar: ND Light Gray Grout: ND Off-white Compound: 2% CH	N/A	4,000 sf
HM 14 / Drywall with Joint Compound	Boys', Girls', and Special ED Restrooms - Walls and Ceilings	*By PLM analysis:* Off-white Joint Compound with Paint: 2% CH White Drywall with Brown Paper: ND *By 400-point count composite:* Drywall/Joint Compound: <0.25% - 0.75% CH	N/A	1,200 sf
Insulation in Fire Doors	At Entry to each Restroom	ASSUMED	RACM	3 doors

ND = None Detected, NA = Not Applicable, CH = Chrysotile, RACM = Regulated asbestos containing material (friable), Cat. I = Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal), Cat. II = Category II Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal), LF = Linear Feet, SF = square feet, EA = Each, *Estimate quantity should be field verified prior to abatement or abatement design

It should be reemphasized that although reasonable efforts were made to survey accessible suspect materials, additional suspect but un-sampled materials could be located under existing building materials, inside walls, above ceilings, in isolated areas or in other concealed areas. Therefore, if suspect materials are encountered during Renovation activities that do not appear to have been characterized as ACM or non-ACM, these materials must be assumed to be ACM until samples are collected and analyzed to prove otherwise. Any assumed material should be treated as asbestos or sampled to determine asbestos content before disturbing the material.

5.2 Lead Containing Paint/Materials

Five (5) painted surfaces and one (1) other building material suspected to contain lead were sampled and analyzed. Five (5) of the samples were reported with lead content. A summary of sample locations and analytical results is below in Table II. Samples reported with “<” are below the laboratory analytical reporting limit for the sample submitted. Laboratory reports are in Appendix C.

Table II
Lead Containing Paint/Materials

Sample #	Sample Description	Sample Location	Total Lead Result (ppm)
Pb-1	Blue paint on wood door	Custodial Room	2,400 ppm
Pb-2	Blue paint on metal door frame	Girl's' Restroom	1,100 ppm
Pb-3	4" Yellow ceramic wall tile	Boys's Restroom	100 ppm
Pb-4	Off-white paint on drywall ceiling	Girl's' Restroom	270 ppm
Pb-5	Off-white paint on drywall wall	Girl's' Restroom	710 ppm
Pb-6	Off-white paint on drywall wall	Special Education Restroom	<40 ppm

ppm = parts per million

Uncharacterized paints and/or suspect materials should be assumed to contain lead until sampling and analysis prove otherwise.

5.3 PCB Containing Materials

Two (2) building envelope sealants were collected and analyzed for potential PCB content. At the time of this report, laboratory results have not been received.

Table III
PCB Containing Materials

Sample #	Material Description	Sample Location	PCB Content
PCB-01A	Sealant associated with brick to stucco	At Girls' Restroom Door	ND <9.90
PCB-02A	Door Frame Sealant – Frame to Brick	At Custodial Room Door	ND <9.52

ppm = parts per million, < = less than laboratory reporting limit

5.4 Other Hazardous Building Materials

Terracon visually assessed the restrooms for the presence of mercury containing products such as fluorescent light tubes, HID bulbs, mercury switches, thermostats, and compact fluorescent light bulbs. Life safety equipment was also assessed for the presence of batteries, LEDs, and radioactive materials including tritium gas in exit signs and Americium-241 in ionization smoke detectors. Terracon only observed twenty-two (22) fluorescent light tubes and eleven (11) suspect PCB-containing light ballasts. No testing was performed.

6.0 LIMITATIONS/GENERAL COMMENTS

Terracon performed limited destructive testing such as knocking holes in walls, dismantling of equipment or removal of protective coverings during the survey. Uncharacterized hidden materials may exist under existing finishes, equipment or structural materials.

This hazardous materials survey was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. The results, findings, conclusions and recommendations expressed in this report are based on conditions observed during our survey at the subject site. The information contained in this report is relevant to the date on which this survey was performed and should not be relied upon to represent conditions at a later date.

This report has been prepared on behalf of and exclusively for use by Lodi Unified School District for specific application to their project as discussed. This report is not a bidding document. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. Terracon does not warrant the work of regulatory agencies, laboratories or other third parties supplying information which may have been used in the preparation of this report. No warranty, express or implied is made.

APPENDIX A

PRE-RENOVATION HAZARDOUS MATERIALS SURVEY

Lodi Middle School - 945 S Ham Lane, Lodi, California

Building F Student Restrooms and Hardscape

Terracon Project No. NA245056_7122

October 2, 2024

ASBESTOS SAMPLE SUMMARY

HM #	Material Description	Sample #	Sample Location	Asbestos Conter by layer	NESHAP Category	Est. Qty
HM 01	Concrete Floor	1A	Boys' Restroom Floor	None detected	N/A	N/A
		1B	Girls' Restroom Floor	None detected		
		1C	Special Education Restroom Floor	None detected		
HM 02	Concrete Walkways	2A	Portico Walkway, North	None detected	N/A	N/A
		2B	Portico Walkway, Northwest	None detected		
		2C	Portico Walkway, South	None detected		
		2D	Portico Walk Way, West	None detected		
		2E	Portico Walk Way, Southwest	None detected		
HM 03	White Caulking associated with Sinks and Urinals	3A	Boys' Restroom Sink	None detected	N/A	N/A
		3B	Boys' Restroom Sink	None detected		
		3C	Girls' Restroom Sink	None detected		
HM 04	Stucco	4A	Exterior Wall at Boys' Restroom Door Entry	None detected	N/A	N/A
		4B	Exterior Wall at Girls' Restroom Door Entry	None detected		
		4C	Exterior Wall at Ceiling Soffit at Door Entry	None detected		
HM 05	Window Glaze - Glass to Frame	5A	Boys' Restroom	None detected	N/A	N/A
		5B	Boys' Restroom	None detected		
		5C	Girls' Restroom	None detected		
HM 06	Exterior Door Frame Sealant	6A	Boys' Restroom	None detected	N/A	N/A
		6B	Girls' Restroom	None detected		
		6C	Special Education Restroom	None detected		

HM #	Material Description	Sample #	Sample Location	Asbestos Conter by layer	NESHAP Category	Est. Qty
HM 07	Beige Wainscot Wall Panel Glue	7A	Special Education Restroom	None detected	N/A	N/A
		7B	Special Education Restroom	None detected		
		7C	Special Education Restroom	None detected		
HM 08	Beige Vinyl Wall Cover with Adhesive	8A	Special Education Restroom Wall	None detected	N/A	N/A
		8B	Special Education Restroom Wall	None detected		
		8C	Special Education Restroom Wall	None detected		
HM 09	Off-white Exterior Sealant - Brick to Stucco	9A	At Boys' Restroom Entry	Off-White Sealant: 2% CH	Cat. II	300 sf
		9B	At Girls' Restroom Entry	Off-White Sealant: 2% CH		
		9C	At Special Education Entry	Off-White Sealant: 2% CH		
HM 10	Exterior Brick Grout	10A	Exterior Wall at Boys' Restroom	None detected	N/A	N/A
		10B	Exterior Wall at Girls' Restroom	None detected		
		10C	Exterior Wall at Special Education Restroom	None detected		
HM 11	Interior Window Frame Sealant - Drywall to Frame	11A	Boys' Restroom above Door	None detected	N/A	N/A
		11B	Boys' Restroom above Door	None detected		
		11C	Girls' Restroom	None detected		
HM 12	4" Brown Cove Base with Beige Glue	12A	Special Education Restroom	None detected	N/A	N/A
		12B	Special Education Restroom	None detected		
		12C	Special Education Restroom	None detected		
HM 13	4" Light Yellow Ceramic Wall Tile with Grout and Mortar	13A	Boys' Restroom	Yellow Ceramic Tile: None detected Dark Gray Mortar: None detected Light Gray Grout: None detected Off-White Compound: 2% CH	N/A	4,000 sf
		13B	Boys' Restroom	Yellow Ceramic Tile: None detected Dark Gray Mortar: None detected Light Gray Grout: None detected Off-White Compound: 2% CH		
		13C	Girls' Restroom	Yellow Ceramic Tile: None detected Dark Gray Mortar: None detected Light Gray Grout: None detected Off-White Compound: 2% CH		

HM #	Material Description	Sample #	Sample Location	Asbestos Conter by layer	NESHAP Category	Est. Qty
HM 14	Drywall with Joint Compound	14A	Boys' Restroom Ceiling	*By PLM analysis:* Off-White Joint Compound with Paint: 2% CH White Drywall with Brown Paper: None detected *By 400-point count composite:* Drywall/joint compound: 0.25% CH	N/A	1,200 sf
		14B	Boys' Restroom Wall	*By PLM analysis:* Off-White Joint Compound with Paint: 2% CH White Drywall with Brown Paper: None detected *By 400-point count composite:* Drywall/joint compound: 0.5% CH		
		14C	Girls' Restroom Ceiling	*By PLM analysis:* Off-White Joint Compound with Paint: 2% CH White Drywall with Brown Paper: None detected *By 400-point count composite:* Drywall/joint compound: 0.25% CH		
		14D	Girls' Restroom Wall	*By PLM analysis:* Off-White Joint Compound with Paint: 2% CH White Drywall with Brown Paper: None detected *By 400-point count composite:* Drywall/joint compound: <0.25% CH		
		14E	Special Education Restroom Wall	*By PLM analysis:* Off-White Joint Compound with Paint: 2% CH White Drywall with Brown Paper: None detected *By 400-point count composite:* Drywall/joint compound: 0.75% CH		
		14F	Special Education Restroom Ceiling	*By PLM analysis:* Off-White Joint Compound with Paint: 2% CH White Drywall with Brown Paper: None detected *By 400-point count composite:* Drywall/joint compound: 0.5% CH		

ND = None Detected, N/A = Not Applicable, CH = Chrysotile, AM = Amosite, RACM = Regulated asbestos containing material (friable), Cat. I = Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal), Cat. II = Category II Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal)

APPENDIX B

ASBESTOS ANALYTICAL LABORATORY DATA

eurofins | Built Environment Testing

Report for:

Denise Wallen
Terracon Consultants, Inc.-Concord
1220 Concord Avenue
Suite 450
Concord, CA 94520

Regarding: Eurofins EPK Built Environment Testing, LLC
Project: NA247122; LODI Middle School
EML ID: 3792204

Approved by:



Approved Signatory
Danny Li

Dates of Analysis:
Asbestos PLM: 09-25-2024

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)
NVLAP Lab Code 200757-0

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the samples as received and tested. The results include an inherent uncertainty of measurement associated with estimating percentages by polarized light microscopy. Measurement uncertainty data for sample results with >1% asbestos concentration can be provided when requested.

Eurofins EPK Built Environment Testing, LLC ("the Company"), a member of the Eurofins Built Environment Testing group of companies, shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

Eurofins EPK Built Environment Testing, LLC
2841 Dow Avenue, Suite 300, Tustin, CA 92780
(833) 465-5857 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Concord
C/O: Denise Wallen
Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Total Samples Submitted:	47
Total Samples Analyzed:	47
Total Samples with Layer Asbestos Content > 1%:	12

Location: 1A, Concrete Floor, Boy's Restroom Floor Lab ID-Version‡: 18710158-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 1B, Concrete Floor, Girl's Restroom Floor Lab ID-Version‡: 18710159-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 1C, Concrete Floor, Special Ed Restroom Floor Lab ID-Version‡: 18710160-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 2A, Concrete-Walk Ways, Portico Walkway-(N) Lab ID-Version‡: 18710161-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

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All components not quantified as asbestos content and non-asbestos content are considered to be non-fibrous matrix components. Matrix components may include, but are not limited to, gypsum, paint, silicate minerals, vinyl, binder, calcium carbonate, tar, and foam.

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

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ASBESTOS PLM REPORT

Location: 2B, Concrete-Walk Ways, Portico Walkway-(NW) Lab ID-Version‡: 18710162-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 2C, Concrete-Walk Ways, Portico Walkway-(S) Lab ID-Version‡: 18710163-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 2D, Continue Hm#02, Portico Walk Way-(W) Lab ID-Version‡: 18710164-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 2E, Continue Hm#02, Portico Walk Way-(SW) Lab ID-Version‡: 18710165-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 3A, White Caulking Associated with Sinks and Urinals, Boy's Restroom Sink Lab ID-Version‡: 18710166-1

Sample Layers	Asbestos Content
White Caulk	ND
Sample Composite Homogeneity:	Good

Location: 3B, White Caulking Associated with Sinks and Urinals, Boy's Restroom Sink Lab ID-Version‡: 18710167-1

Sample Layers	Asbestos Content
White Caulk	ND
Sample Composite Homogeneity:	Good

Location: 3C, White Caulking Associated with Sinks and Urinals, Girl's Restroom Sink Lab ID-Version‡: 18710168-1

Sample Layers	Asbestos Content
White Caulk	ND
Sample Composite Homogeneity:	Good

Location: 4A, Stucco, Exterior Wall at Boy's Restroom Door Entry Lab ID-Version‡: 18710169-1

Sample Layers	Asbestos Content
Dark Gray Stucco	ND
Light Gray Stucco	ND
Sample Composite Homogeneity:	Moderate

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Date of Sampling: 09-23-2024
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ASBESTOS PLM REPORT

Location: 4B, Stucco, Exterior Wall at Girl's Restroom Door Entry Lab ID-Version‡: 18710170-1

Sample Layers	Asbestos Content
Dark Gray Stucco	ND
Light Gray Stucco	ND
Sample Composite Homogeneity:	Moderate

Location: 4C, Stucco, Exterior Wall at Ceiling Soffit at Door Entry Lab ID-Version‡: 18710171-1

Sample Layers	Asbestos Content
Dark Gray Stucco	ND
Light Gray Stucco	ND
Sample Composite Homogeneity:	Moderate

Location: 5A, Window Glaze-Glass to Frame, Boy's Restroom Lab ID-Version‡: 18710172-1

Sample Layers	Asbestos Content
Gray Window Glazing	ND
Sample Composite Homogeneity:	Good

Location: 5B, Window Glaze-Glass to Frame, Boy's Restroom Lab ID-Version‡: 18710173-1

Sample Layers	Asbestos Content
Gray Window Glazing	ND
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 5C, Window Glaze-Glass to Frame, Girl's Restroom Lab ID-Version‡: 18710174-1

Sample Layers	Asbestos Content
Gray Window Glazing	ND
Sample Composite Homogeneity:	Good

Location: 6A, Exterior Door Frame Sealant, Boy's Restroom Lab ID-Version‡: 18710175-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

Location: 6B, Exterior Door Frame Sealant, Girl's Restroom Lab ID-Version‡: 18710176-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

Location: 6C, Exterior Door Frame Sealant, Special ED Restroom Lab ID-Version‡: 18710177-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

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Re: NA247122; LODI Middle School

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ASBESTOS PLM REPORT

Location: 7A, Wainscot Wall Panel Glue(Beige), Special ED Restroom Lab ID-Version‡: 18710178-1

Sample Layers	Asbestos Content
Beige Glue	ND
White Compound	ND
Sample Composite Homogeneity:	Good

Location: 7B, Wainscot Wall Panel Glue(Beige), Special ED Restroom Lab ID-Version‡: 18710179-1

Sample Layers	Asbestos Content
Beige Glue	ND
White Compound	ND
Sample Composite Homogeneity:	Good

Location: 7C, Wainscot Wall Panel Glue(Beige), Special ED Restroom Lab ID-Version‡: 18710180-1

Sample Layers	Asbestos Content
Beige Glue	ND
White Compound	ND
Sample Composite Homogeneity:	Good

Location: 8A, Beige-Vinyl Wall Corner with Adhesive, Special ED Restroom Wall Lab ID-Version‡: 18710181-1

Sample Layers	Asbestos Content
Beige Wallpaper	ND
Beige Adhesive	ND
Brown Paper	ND
Composite Non-Asbestos Content:	40% Cellulose
Sample Composite Homogeneity:	Good

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Date of Sampling: 09-23-2024
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Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Location: 8B, Beige-Vinyl Wall Corner with Adhesive, Special ED Restroom Wall Lab ID-Version‡: 18710182-1

Sample Layers	Asbestos Content
Beige Wallpaper	ND
Beige Adhesive	ND
Brown Paper	ND
Composite Non-Asbestos Content:	40% Cellulose
Sample Composite Homogeneity:	Good

Location: 8C, Beige-Vinyl Wall Corner with Adhesive, Special ED Restroom Wall Lab ID-Version‡: 18710183-1

Sample Layers	Asbestos Content
Beige Wallpaper	ND
Beige Adhesive	ND
Brown Paper	ND
Composite Non-Asbestos Content:	40% Cellulose
Sample Composite Homogeneity:	Good

Location: 9A, Off White Exterior Sealant Brick to Stucco, at Boy's Restroom Entry Lab ID-Version‡: 18710184-1

Sample Layers	Asbestos Content
Off-White Sealant	2% Chrysotile
Sample Composite Homogeneity:	Good

Location: 9B, Off White Exterior Sealant Brick to Stucco, at Girl's Restroom Entry Lab ID-Version‡: 18710185-1

Sample Layers	Asbestos Content
Off-White Sealant	2% Chrysotile
Sample Composite Homogeneity:	Good

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‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

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C/O: Denise Wallen
Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Location: 9C, Off White Exterior Sealant Brick to Stucco, at Special ED Entry Lab ID-Version‡: 18710186-1

Sample Layers	Asbestos Content
Off-White Sealant	2% Chrysotile
Sample Composite Homogeneity:	Good

Location: 10A, Exterior Brick Grout, Exterior Wall-at Boy's Restroom Lab ID-Version‡: 18710187-1

Sample Layers	Asbestos Content
Gray Grout	ND
Sample Composite Homogeneity:	Good

Location: 10B, Exterior Brick Grout, Exterior Wall-at Girl's Restroom Lab ID-Version‡: 18710188-1

Sample Layers	Asbestos Content
Gray Grout	ND
Red Brick	ND
Sample Composite Homogeneity:	Good

Location: 10C, Exterior Brick Grout, Exterior Wall-at Special ED Restroom Lab ID-Version‡: 18710189-1

Sample Layers	Asbestos Content
Gray Grout	ND
Red Brick	ND
Sample Composite Homogeneity:	Good

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All components not quantified as asbestos content and non-asbestos content are considered to be non-fibrous matrix components. Matrix components may include, but are not limited to, gypsum, paint, silicate minerals, vinyl, binder, calcium carbonate, tar, and foam.

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‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins EPK Built Environment Testing, LLC
2841 Dow Avenue, Suite 300, Tustin, CA 92780
(833) 465-5857 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Concord
C/O: Denise Wallen
Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Location: 11A, Interior Window Frame Sealant DW to Frame, Boy's Restroom Above Door

Lab ID-Version‡: 18710190-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

Location: 11B, Interior Window Frame Sealant DW to Frame, Boy's Restroom Above Door

Lab ID-Version‡: 18710191-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

Location: 11C, Interior Window Frame Sealant DW to Frame, Girl's Restroom

Lab ID-Version‡: 18710192-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

Location: 12A, 4" Brown Cove Base Glue(Beige), Special ED Restroom

Lab ID-Version‡: 18710193-1

Sample Layers	Asbestos Content
Beige Glue	ND
Sample Composite Homogeneity:	Good

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Client: Terracon Consultants, Inc.-Concord
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Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Location: 12B, 4" Brown Cove Base Glue(Beige), Special ED Restroom Lab ID-Version‡: 18710194-1

Sample Layers	Asbestos Content
Beige Glue	ND
Sample Composite Homogeneity:	Good

Location: 12C, 4" Brown Cove Base Glue(Beige), Special ED Restroom Lab ID-Version‡: 18710195-1

Sample Layers	Asbestos Content
Beige Glue	ND
Sample Composite Homogeneity:	Good

Location: 13A, 4" Light Yellow Ceramic Wall Tile w/Grout and Mortar, Boy's Restroom

Lab ID-Version‡: 18710196-1

Sample Layers	Asbestos Content
Yellow Ceramic Tile	ND
Dark Gray Mortar	ND
Light Gray Grout	ND
Off-White Compound	2% Chrysotile
Sample Composite Homogeneity:	Poor

Location: 13B, 4" Light Yellow Ceramic Wall Tile w/Grout and Mortar, Boy's Restroom

Lab ID-Version‡: 18710197-1

Sample Layers	Asbestos Content
Yellow Ceramic Tile	ND
Dark Gray Mortar	ND
Light Gray Grout	ND
Off-White Compound	2% Chrysotile
Sample Composite Homogeneity:	Poor

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Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Location: 13C, 4" Light Yellow Ceramic Wall Tile w/Grout and Mortar, Girl's Restroom

Lab ID-Version‡: 18710198-1

Sample Layers	Asbestos Content
Yellow Ceramic Tile	ND
Dark Gray Mortar	ND
Light Gray Grout	ND
Off-White Compound	2% Chrysotile
Sample Composite Homogeneity:	Poor

Location: 14A, Drywall with Joint Compound, Boy's Restroom Ceiling

Lab ID-Version‡: 18710199-1

Sample Layers	Asbestos Content
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

Location: 14B, Drywall with Joint Compound, Boy's Restroom Wall

Lab ID-Version‡: 18710200-1

Sample Layers	Asbestos Content
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

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Client: Terracon Consultants, Inc.-Concord
C/O: Denise Wallen
Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Location: 14C, Drywall with Joint Compound, Girl's Restroom Ceiling Lab ID-Version‡: 18710201-1

Sample Layers	Asbestos Content
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

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Client: Terracon Consultants, Inc.-Concord
C/O: Denise Wallen
Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

ASBESTOS PLM REPORT

Location: 14D, Continue Hm#14, Girl's Restroom Wall

Lab ID-Version‡: 18710202-1

Sample Layers	Asbestos Content
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

Location: 14E, Continue Hm#14, Special ED Restroom Wall

Lab ID-Version‡: 18710203-1

Sample Layers	Asbestos Content
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

Location: 14F, Continue Hm#14, Special ED Restroom Ceiling

Lab ID-Version‡: 18710204-1

Sample Layers	Asbestos Content
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

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003792204

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(1)

E-MAIL REPORT TO: *SEE BELOW PROJECT MANAGER (PM)*

☐ PM – Steff Steiner steff.steiner@terracon.com
☐ PM – Karin Schroeter karin.schroeter@terracon.com
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☐ PM- David Block david.block@terracon.com
☑ denise.wallen@terracon.com Engineering Assistant
☐ heidi.santos@terracon.com Engineering Assistant

ACM BULK SAMPLE DATA SHEET

☑ PLM Analysis (Analyze all samples)
☐ Stop Analysis at First Positive
☑ Point Count Analysis (400-point)*
* IF DRYWALL WITH JOINT COMPOUND TEST POSITIVE

Project Name/ Address/ Building No. LODI MIDDLE SCHOOL

Project# NA247122 **Sampled By:** M. REED **Sampling Date:** 9-23-2024

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☐ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☐ 3-5 days

HM# 01	Material Description CONCRETE FLOOR	
Sample ID	**Sample Location & Material Location**	**Quantity:** 600 SQFT
1A	BOY'S RESTROOM FLOOR	
1B	GIRL'S RESTROOM FLOOR	
1C	SPEACIAL ED. RESTROOM FLOOR	

HM# 02	Material Description: CONCRETE - WALK WAYS	
Sample ID	**Sample Location & Material Location**	**Quantity:** 10,000 SQFT
2A	PORTICO WALK WAY - (N)	
2B	- (NW)	
2C	- (S)	

HM# 02	Material Description: CONTINUE HM # 02	
Sample ID	**Sample Location & Material Location**	**Quantity:**
2D	PORTICO WALK WAY - (W)	
2E	- (SW)	

HM# 03	Material Description: WHITE CAULKING ASSOCIATED WITH SINKS & URINALS	
Sample ID	**Sample Location & Material Location**	**Quantity:** 75 SQFT
3A	BOY'S RESTROOM SINK	
3B	BOY'S RESTROOM SINK	
3C	GIRL'S RESTROOM SINK	

HM# 04	Material Description: STUCCO	
Sample ID	**Sample Location & Material Location**	**Quantity:** 200 SQFT
4A	EXTERIOR WALL AT BOY'S RESTROOM DOOR ENTRY	
4B	" " AT GIRL'S RESTROOM DOOR ENTRY	
4C	" " AT CEILING SOFFIT AT DOOR ENTRY	

Relinquished By:	M. REED	**Signature:**	M. Reed	**Date/Time:**	9-23-2024
Received By:	STEVEN CASTILLO	**Signature:**		**Date/Time:**	9/24/24 9:45a
Relinquished By:		**Signature:**		**Date/Time:**	
Received By:		**Signature:**		**Date/Time:**	

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(2)

E-MAIL REPORT TO: *SEE BELOW PROJECT MANAGER (PM)*

☐ PM – Steff Steiner steff.steiner@terracon.com
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☐ PM – Tedd Kattchee tedd.kattchee@terracon.com
☐ PM- David Block david.block@terracon.com
☑ denise.wallen@terracon.com Engineering Assistant
☐ heidi.santos@terracon.com Engineering Assistant

ACM BULK SAMPLE DATA SHEET

☑ PLM Analysis (Analyze all samples)
☐ Stop Analysis at First Positive
☑ Point Count Analysis (400-point)

Project Name/ Address/ Building No. LODI MIDDLE SCHOOL

Project# NA247122 **Sampled By:** M. REED **Sampling Date:** 9-23-2024

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☐ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☐ 3-5 days

HM# 05	Material Description: WINDOW GLAZE - GLASS TO FRAME	
Sample ID	Sample Location & Material Location	Quantity: 10 SQFT
5A	BOY'S RESTROOM	
5B	BOY'S RESTROOM	
5C	GIRL'S RESTROOM	

HM# 06	Material Description: EXTERIOR DOOR FRAME SEALANT	
Sample ID	Sample Location & Material Location	Quantity: 100 SQFT
6A	BOY'S RESTROOM	
6B	GIRL'S RESTROOM	
6C	SPECIAL ED RESTROOM	

HM# 07	Material Description: WAINSCOT WALL PANEL GLUE (BEIGE)	
Sample ID	Sample Location & Material Location	Quantity: 125 SQFT
7A	SPECIAL ED RESTROOM	
7B		
7C		

HM# 08	Material Description: BEIGE - VINYL WALL COVER WITH ADHESIVE	
Sample ID	Sample Location & Material Location	Quantity: 400 SQFT
8A	SPECIAL ED. RESTROOM WALL	
8B		
8C		

HM# 09	Material Description: OFF WHITE EXTERIOR SEALANT BRICK TO STUCCO	
Sample ID	Sample Location & Material Location	Quantity: 300 SQFT
9A	AT BOY'S RESTROOM ENTRY	
9B	AT GIRL'S RESTROOM ENTRY	
9C	AT SPECIAL ED. ENTRY	

Relinquished By:	M. REED	Signature:	M. Reed	Date/Time:	9-23-2024
Received By:	STEVEN CASTILLO	Signature:		Date/Time:	9/24/24 4:43
Relinquished By:		Signature:		Date/Time:	
Received By:		Signature:		Date/Time:	

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(3)

E-MAIL REPORT TO: *SEE BELOW PROJECT MANAGER (PM)**

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☐ PM- David Block david.block@terracon.com
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ACM BULK SAMPLE DATA SHEET

☑ PLM Analysis (Analyze all samples)
☐ Stop Analysis at First Positive
☑ Point Count Analysis (400-point)*

Project Name/ Address/ Building No. LODI MIDDLE SCHOOL

Project# NA247122 **Sampled By:** M. REED **Sampling Date:** 9-23-2024

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☐ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☐ 3-5 days

HM# 10	Material Description EXTERIOR BRICK GROUT	
Sample ID	**Sample Location & Material Location**	**Quantity:** 10,000 SQFT
10A	EXTERIOR WALL - AT BOY'S RESTROOM	
10B	- AT GIRL'S	
10C	- AT SPECIAL ED.	
HM# 11	**Material Description:** INTERIOR WINDOW FRAME SEALANT DW TO FRAME	
Sample ID	**Sample Location & Material Location**	**Quantity:** 15 SQFT
11A	BOY'S RESTROOM ABOVE DOOR	
11B	" "	
11C	GIRL'S RESTROOM	
HM# 12	**Material Description:** 4" BROWN COVE BASE GLUE (BEIGE)	
Sample ID	**Sample Location & Material Location**	**Quantity:** 50 SQFT
12A	SPECIAL ED RESTROOM	
12B	" "	
12C	" "	
HM# 13	**Material Description:** 4" LIGHT YELLOW CERAMIC WALL TILE W/GROUT & MORTAR	
Sample ID	**Sample Location & Material Location**	**Quantity:** 4,000 SQFT
13A	BOY'S RESTROOM	
13B	BOY'S RESTROOM	
13C	GIRL'S RESTROOM	
HM# 14	**Material Description:** DRYWALL WITH JOINT COMPOUND	
Sample ID	**Sample Location & Material Location**	**Quantity:** 1200 SQFT
14A	BOY'S RESTROOM CEILING	
14B	" " WALL	
14C	GIRL'S RESTROOM CEILING	

Relinquished By:	M. REED	**Signature:**	M. Reed	**Date/Time:**	9-23-2024
Received By:	STEVEN CASTILLO	**Signature:**		**Date/Time:**	9/24/24 9:45
Relinquished By:		**Signature:**		**Date/Time:**	
Received By:		**Signature:**		**Date/Time:**	

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(4)

E-MAIL REPORT TO: *SEE BELOW PROJECT MANAGER (PM)*

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- ☐ PM – Karin Schroeter karin.schroeter@terracon.com
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ACM BULK SAMPLE DATA SHEET

- ☑ PLM Analysis (Analyze all samples)
- ☐ Stop Analysis at First Positive
- ☐ Point Count Analysis (400-point)

Project Name/ Address/ Building No. LODI MIDDLE SCHOOL

Project# NA247122 **Sampled By:** M. REED **Sampling Date:** 9-23-2024

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☐ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☐ 3-5 days

HM# 14	Material Description CONTINUE HM# 14	
Sample ID	**Sample Location & Material Location**	**Quantity:**
14D	GIRL'S RESTROOM WALL	
14E	SPECIAL ED RESTROOM WALL	
14F	SPECIAL ED RESTROOM CEILING	

HM#	Material Description:	
Sample ID	**Sample Location & Material Location**	**Quantity:**

HM#	Material Description:	
Sample ID	**Sample Location & Material Location**	**Quantity:**

HM#	Material Description:	
Sample ID	**Sample Location & Material Location**	**Quantity:**

HM#	Material Description:	
Sample ID	**Sample Location & Material Location**	**Quantity:**

Relinquished By:	M. REED	**Signature:**	M. Reed	**Date/Time:** 9-23-2024
Received By:	STEVEN CASTILLO	**Signature:**		**Date/Time:** 9/24/24 0746
Relinquished By:		**Signature:**		**Date/Time:**
Received By:		**Signature:**		**Date/Time:**

APPENDIX C

LEAD ANALYTICAL LABORATORY DATA

eurofins | Built Environment Testing

Report for:

Denise Wallen
Terracon Consultants, Inc.-Concord
1220 Concord Avenue
Suite 450
Concord, CA 94520

Regarding: Eurofins EPK Built Environment Testing, LLC
Project: NA247122; LODI Middle School
EML ID: 3792324

Approved by:



Approved Signatory
Andrew Arestegui

Dates of Analysis:
Lead - Flame AA: 09-25-2024

Service SOPs: Lead - Flame AA (EM-BC-S-8443)
AIHA LAP, LLC accredited service, Lab ID #178697

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received and tested. Sample size, as it relates to Wipe samples only, is supplied by the client.

Eurofins EPK Built Environment Testing, LLC ("the Company"), a member of the Eurofins Built Environment Testing group of companies, shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.
Eurofins EPK Built Environment Testing, LLC's LabServe® reporting system includes automated fail-safes to ensure that all AIHA LAP, LLC quality requirements are met and notifications are added to reports when any quality steps remain pending.

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(833) 465-5857 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Concord
C/O: Denise Wallen
Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

LEAD: FLAME ATOMIC ABSORPTION SPECTROMETRY

Location:	Pb-1: Blue, Wood, Door, Custodial Room Door	Pb-2: Blue, metal, Door Frame, Girl's Restroom Door Frame	Pb-3: Light Yellow, Drywall, Wall, Boy's Restroom-4" CWT
Comments (see below)	None	None	None
Lab ID-Version‡:	18710480-1	18710481-1	18710482-1
Analysis Date:	09/25/2024	09/25/2024	09/25/2024
Sample type	Paint Chip sample	Paint Chip sample	Bulk sample
Method*	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified
† Method Reporting Limit	39 ppm	39 ppm	39 ppm
Sample size	0.2583 grams	0.2586 grams	0.2556 grams
§Total Lead Result	2400 ppm	1100 ppm	100 ppm

Comments:

Sample results have not been corrected for blank values.

Bulk samples are not covered under the AIHA LAP, LLC service accreditation.

Wipe samples must meet ASTM E1792 criteria. Method Reporting Limits may not be valid for non-ASTM E1792 wipe samples.

*Sample preparation and analytical methods are based upon NIOSH 7082 and EPA 7000B.

† The Method Reporting Limit is the minimum concentration of Lead that the laboratory can confidently detect in the sample.

§ Total Lead Result has been rounded to two significant figures to reflect analytical precision.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins EPK Built Environment Testing, LLC
2841 Dow Avenue, Suite 300, Tustin, CA 92780
(833) 465-5857 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Concord
C/O: Denise Wallen
Re: NA247122; LODI Middle School

Date of Sampling: 09-23-2024
Date of Receipt: 09-24-2024
Date of Report: 09-25-2024

LEAD: FLAME ATOMIC ABSORPTION SPECTROMETRY

Location:	Pb-4: Off White, Drywall, Ceiling, Girl's Restroom Ceiling	Pb-5: Off White, Drywall, Wall, Girl's Restroom Wall	Pb-6: Off White, Drywall, Wall, Special ED Restroom-Wall Vinyl Wall Cover
Comments (see below)	None	None	None
Lab ID-Version‡:	18710483-1	18710484-1	18710485-1
Analysis Date:	09/25/2024	09/25/2024	09/25/2024
Sample type	Paint Chip sample	Paint Chip sample	Paint Chip sample
Method*	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified
† Method Reporting Limit	39 ppm	39 ppm	40 ppm
Sample size	0.2597 grams	0.2584 grams	0.2511 grams
§Total Lead Result	270 ppm	710 ppm	< 40 ppm

Comments:

Sample results have not been corrected for blank values.

Bulk samples are not covered under the AIHA LAP, LLC service accreditation.

Wipe samples must meet ASTM E1792 criteria. Method Reporting Limits may not be valid for non-ASTM E1792 wipe samples.

*Sample preparation and analytical methods are based upon NIOSH 7082 and EPA 7000B.

† The Method Reporting Limit is the minimum concentration of Lead that the laboratory can confidently detect in the sample.

§ Total Lead Result has been rounded to two significant figures to reflect analytical precision.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

003792324

Terracon

E-MAIL REPORT TO: PROJECT MANAGER (PM)

☑ denise.wallen@terracon.com Engineering Assistant	☐ heidi.santos@terracon.com Engineering Assistant	
☐ PM – Steff Steiner steff.steiner@terracon.com	☐ PM – Karin Schroeter karin.schroeter@terracon.com	
☐ PM – Ken Pilgrim ken.pilgrim@terracon.com	☐ PM – Tedd Kattchee tedd.kattchee@terracon.com	☐ PM – David Block david.block@terracon.com

LEAD PAINT SAMPLE DATA SHEET

* Lead Analysis

_____ Flame AA (EPA 7420) _____ TTLC

Project Name/ Address/ Building No. LODI MIDDLE SCHOOL

Project# NA247122 **Sampled By:** M. REED **Sampling Date:** 9-23-2024

Sample(s) sent to: ☐ MAL ☐ EMSL ☐ Eurofins **Other** _____

TAT ☐ Rush ☑ 24HRS ☐ 48HRS ☐ 3-5 Day

Sample ID	Paint Description and Sample Location	Condition (I/F/P)
Pb-1	Paint Color: BLUE Substrate: WOOD Component: DOOR Sample Location: Bldg # _____ Unit # _____ Room _____ CUSTODIAL ROOM DOOR	I
Pb-2	Paint Color: BLUE Substrate: METAL Component: DOOR FRAME Sample Location: Bldg # _____ Unit # _____ Room _____ GIRL'S RESTROOM DOOR FRAME	I
Pb-3	~~Paint~~ BULK Color: LIGHT YELLOW Substrate: DRYWALL Component: WALL Sample Location: Bldg # _____ Unit # _____ Room _____ BOY'S RESTROOM - 4" CUT	I
Pb-4	Paint Color: OFF WHITE Substrate: DRYWALL Component: CEILING Sample Location: Bldg # _____ Unit # _____ Room _____ GIRL'S RESTROOM CEILING	I
Pb-5	Paint Color: OFF WHITE Substrate: DRYWALL Component: WALL Sample Location: Bldg # _____ Unit # _____ Room _____ GIRL'S RESTROOM WALL	I

Relinquished By:	M. REED	**Signature:**	M. Reed	**Date/Time:** 9-23-2024
Received By:	STEVEN CASTILLO	**Signature:**	[signature]	**Date/Time:** 9/24/24 9:45A
Relinquished By:		**Signature:**		**Date/Time:**
Received By:		**Signature:**		**Date/Time:**

003792324

Terracon

E-MAIL REPORT TO: *PROJECT MANAGER (PM)*

☑ denise.wallen@terracon.com Engineering Assistant	☐ heidi.santos@terracon.com Engineering Assistant	**LEAD PAINT SAMPLE DATA SHEET**
☐ PM – Steff Steiner steff.steiner@terracon.com	☐ PM – Karin Schroeter karin.schroeter@terracon.com	* Lead Analysis ____ Flame AA (EPA 7420) ____ TTLC PAGE 2 OF 2
☐ PM – Ken Pilgrim ken.pilgrim@terracon.com	☐ PM – Tedd Kattchee tedd.kattchee@terracon.com	☐ PM – David Block david.block@terracon.com

Project Name/ Address/ Building No. LODI MIDDLE SCHOOL

Project# NA247122 **Sampled By:** M. REED **Sampling Date:** 9-23-2024

Sample(s) sent to: ☐ MAL ☐ EMSL ☐ Eurofins **Other** ____

TAT ☐ Rush ☑ 24HRS ☐ 48HRS ☐ 3-5 Day

Sample ID	Paint Description and Sample Location	Condition (I/F/P)
Pb-6	Paint Color: OFF WHITE Substrate: DRYWALL Component: WALL Sample Location: Bldg # ____ Unit # ____ Room SPECIAL ED RESTROOM - WALL VINYL WALL	I COVER
	Paint Color: ____ Substrate: ____ Component: ____ Sample Location: Bldg # ____ Unit # ____ Room ____	
	Paint Color: ____ Substrate: ____ Component: ____ Sample Location: Bldg # ____ Unit # ____ Room ____	
	Paint Color: ____ Substrate: ____ Component: ____ Sample Location: Bldg # ____ Unit # ____ Room ____	
	Paint Color: ____ Substrate: ____ Component: ____ Sample Location: Bldg # ____ Unit # ____ Room ____	

Relinquished By:	M. REED	**Signature:**	M. Reed	**Date/Time:**	9-23-24
Received By:	STEVEN CASTILLO	**Signature:**	[signature]	**Date/Time:**	9/24/24 09:45h
Relinquished By:		**Signature:**		**Date/Time:**	
Received By:		**Signature:**		**Date/Time:**	

APPENDIX D

PCB ANALYTICAL LABORATORY DATA

SGS EXCELCHEM Laboratories, Inc.

1135 W Sunset Boulevard
Suite A
Rocklin, CA 95765
Phone# 916-543-4445

ELAP Certificate No. : 2119

01 October 2024

Nicole Adams

SGS Forensic Laboratories - Hayward

3777 Depot Road, Suite 409

Hayward, CA 94545

RE: NA247122

Work order number:2409129

Enclosed are the results of analyses for samples received by the laboratory on 09/25/24 09:35. All Quality Control results are within acceptable limits except where noted as a case narrative. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,



Doug Selby, Technical Director

SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PCB-1A	2409129-01	Solid	09/23/24 11:00	09/25/24 09:35
PCB-2A	2409129-02	Solid	09/23/24 11:05	09/25/24 09:35

SGS Excelchem Laboratories, Inc.

Doug Selby, Technical Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

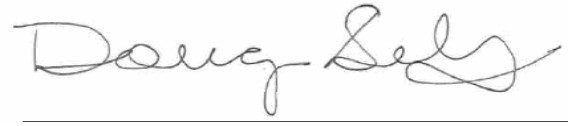
SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

PCB-1A
2409129-01 (Solid)

Analyte	Result	Reporting Limit	MDL	DF	Units	Batch	Date Prepared	Date Analyzed	Method	Notes
PCBs by GC/ECD										
Aroclor 1016	ND	9.90	4.50	5	mg/kg	AHJ0009	09/27/24	10/01/24	PCBs BY EPA 8082	R-07, U
Aroclor 1221	ND	9.90	4.50	5	"	"	"	"	"	R-07, U
Aroclor 1232	ND	9.90	4.50	5	"	"	"	"	"	R-07, U
Aroclor 1242	ND	9.90	4.50	5	"	"	"	"	"	R-07, U
Aroclor 1248	ND	9.90	4.50	5	"	"	"	"	"	R-07, U
Aroclor 1254	ND	9.90	4.50	5	"	"	"	"	"	R-07, U
Aroclor 1260	ND	9.90	4.44	5	"	"	"	"	"	R-07, U
Total PCBs	ND	9.90	4.50	5	"	"	"	"	"	R-07, U
Surrogate: Decachlorobiphenyl	*78.7 %*	% Recovery Limits			*60-140*				"	
Surrogate: Tetrachloro-meta-xylene	*90.1 %*	% Recovery Limits			*60-140*				"	

SGS Excelchem Laboratories, Inc.



Doug Selby, Technical Director

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SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

PCB-2A
2409129-02 (Solid)

Analyte	Result	Reporting Limit	MDL	DF	Units	Batch	Date Prepared	Date Analyzed	Method	Notes
PCBs by GC/ECD										
Aroclor 1016	ND	9.52	4.33	5	mg/kg	AHJ0009	09/27/24	10/01/24	PCBs BY EPA 8082	R-07, U
Aroclor 1221	ND	9.52	4.33	5	"	"	"	"	"	R-07, U
Aroclor 1232	ND	9.52	4.33	5	"	"	"	"	"	R-07, U
Aroclor 1242	ND	9.52	4.33	5	"	"	"	"	"	R-07, U
Aroclor 1248	ND	9.52	4.33	5	"	"	"	"	"	R-07, U
Aroclor 1254	ND	9.52	4.33	5	"	"	"	"	"	R-07, U
Aroclor 1260	ND	9.52	4.27	5	"	"	"	"	"	R-07, U
Total PCBs	ND	9.52	4.33	5	"	"	"	"	"	R-07, U
Surrogate: Decachlorobiphenyl	*318 %*	% Recovery Limits			*60-140*				"	*S-06*
Surrogate: Tetrachloro-meta-xylene	*114 %*	% Recovery Limits			*60-140*				"	

SGS Excelchem Laboratories, Inc.

Doug Selby, Technical Director

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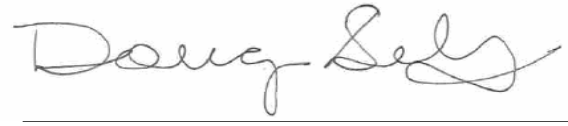
SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

PCBs by GC/ECD - Quality Control

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch AHJ0009 - PCBs BY EPA 8082											
Blank (AHJ0009-BLK1)					Prepared: 09/27/24 Analyzed: 09/30/24						
Surrogate: Decachlorobiphenyl	*0.136*			*mg/kg*	*0.195*		*69.6*	*60-140*			
Surrogate: Tetrachloro-meta-xylene	*0.173*			*"*	*0.195*		*88.4*	*60-140*			
Aroclor 1016	ND	0.976	0.444	"							U
Aroclor 1221	ND	0.976	0.444	"							U
Aroclor 1232	ND	0.976	0.444	"							U
Aroclor 1242	ND	0.976	0.444	"							U
Aroclor 1248	ND	0.976	0.444	"							U
Aroclor 1254	ND	0.976	0.444	"							U
Aroclor 1260	ND	0.976	0.437	"							U
Total PCBs	ND	0.976	0.444	"							U
LCS (AHJ0009-BS1)					Prepared: 09/27/24 Analyzed: 09/30/24						
Surrogate: Decachlorobiphenyl	*0.0120*			*mg/kg*	*0.0200*		*60.2*	*60-140*			
Surrogate: Tetrachloro-meta-xylene	*0.0165*			*"*	*0.0200*		*82.5*	*60-140*			
Aroclor 1016	0.836	0.100	0.0455	"	0.998		83.8	50-150			
Aroclor 1260	0.803	0.100	0.0448	"	0.998		80.5	50-150			
LCS Dup (AHJ0009-BSD1)					Prepared: 09/27/24 Analyzed: 09/30/24						
Surrogate: Decachlorobiphenyl	*0.0133*			*mg/kg*	*0.0200*		*66.7*	*60-140*			
Surrogate: Tetrachloro-meta-xylene	*0.0171*			*"*	*0.0200*		*85.7*	*60-140*			
Aroclor 1016	0.829	0.100	0.0455	"	0.999		83.0	50-150	0.897	50	
Aroclor 1260	0.840	0.100	0.0448	"	0.999		84.1	50-150	4.45	50	
Matrix Spike (AHJ0009-MS1)				**Source: 2409135-01**	Prepared: 09/27/24 Analyzed: 09/30/24						
Surrogate: Decachlorobiphenyl	*0.744*			*mg/kg*	*0.396*		*188*	*60-140*			*S-06*
Surrogate: Tetrachloro-meta-xylene	*0.462*			*"*	*0.396*		*117*	*60-140*			
Aroclor 1016	18.2	1.98	0.901	"	19.8	ND	91.7	50-150			
Aroclor 1260	12.2	1.98	0.887	"	19.8	ND	61.7	50-150			

SGS Excelchem Laboratories, Inc.



Doug Selby, Technical Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

PCBs by GC/ECD - Quality Control

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch AHJ0009 - PCBs BY EPA 8082											
Matrix Spike Dup (AHJ0009-MSD1)			**Source: 2409135-01**		Prepared: 09/27/24 Analyzed: 09/30/24						
Surrogate: Decachlorobiphenyl	*1.32*			*mg/kg*	*0.392*		*338*	*60-140*			*S-06*
Surrogate: Tetrachloro-meta-xylene	*0.453*			*"*	*0.392*		*116*	*60-140*			
Aroclor 1016	20.0	1.96	0.892	"	19.6	ND	102	50-150	9.80	50	
Aroclor 1260	15.2	1.96	0.878	"	19.6	ND	77.6	50-150	21.9	50	

SGS Excelchem Laboratories, Inc.



Doug Selby, Technical Director

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SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

Notes and Definitions

U	Undetected
S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
R-07	This sample was diluted due to matrix interference, resulting in elevated reporting limits
ND	Analyte not detected at the reporting limit.
NR	Not reported

SGS Excelchem Laboratories, Inc.

Doug Selby, Technical Director

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SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

SGS

Subcontract Sample Release Form & Receipt

Sending To: SGS Excelchem
Attn: Joe Trapasso
1135 W. Sunset Blvd.
Suite A
Rocklin, CA 95765

Phone: 916-543-4445
Fax: 916-543-4449
Email: joseph.trapasso@sgs.com

Date: 09/24/2024

From: Terracon - Concord
Parent RN:

SGS Forensic Laboratories on this day releases custody and control of the following sample(s) presently in our custody:

FALI Job	P.O.	Analysis Requested	Due Date
L1969	U003326	PLEASE ADD LOCATION + DESCRIPTION for each sample	10/02/2024 5 DAY T

PLEASE USE Report U003326 as the Purchase Order (PO).

Special Handling: **Send results and invoice only to ENV.Hayward.SUBCONTRACT@sgs.com**

SUBMISSION LOCATION (Please circle)

SGS
3777 Depot Road, Suite 409
Hayward, CA 94545

SGS
20535 S. Belshaw Avenue
Carson, CA 90746

SGS
3626 Sunset Rd., Suite 100
Las Vegas, NV 89120

Released By: _____
(SGS)

Andrea Moran
(Print Name)

9/24/2024 3PM
(Date / Time)

Received By: Becky Miller
(Client / Vendor Representative)

_____
(Print Name)

9/25/24 09:35
(Date / Time)

Printed: 09/24/24 09:37

Page 1 of 1

SGS Excelchem Laboratories, Inc.

Doug Selby

Doug Selby, Technical Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

Terracon

***E-MAIL REPORT TO: PROJECT MANAGER (PM) AND ADDITIONAL RECIPIENTS BELOW ***

☐ PM – Steff Steiner steff.steiner@terracon.com
☐ PM – Karin Schroeter karin.schroeter@terracon.com
☐ PM – Ken Pilgrim ken.pilgrim@terracon.com
☐ PM – David Block david.block@terracon.com
☐ PM – Tedd Kattchee tedd.kattchee@terracon.com
☑ denise.wallen@terracon.com Engineering Assistant
☐ heidi.santos@terracon.com Engineering Assistant

PCB
BULK SAMPLE DATA SHEET
PAGE 1 OF 1

Project Name/ Address/ Building No. LODI MIDDLE SCHOOL
Project# NA247122 **Sampled By:** M. REED **Sampling Date:** 9-23-2024
Sample(s) sent to: TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# PCB-01	Material Description: SEALANT ASSOCIATED WITH BRICK TO STUCCO
Sample ID	Sample Location & Material Location — Quantity:
PCB-1A	AT GIRL'S RESTROOM DOOR
HM# PCB-02	Material Description: DOOR FRAME SEALANT FRAME TO BRICK
Sample ID	Sample Location & Material Location — Quantity:
PCB-2A	AT CUSTODIAL ROOM DOOR
HM#	Material Description:
Sample ID	Sample Location & Material Location — Quantity:
HM#	Material Description:
Sample ID	Sample Location & Material Location — Quantity:
	B-28 2409129
HM#	Material Description:
Sample ID	Sample Location & Material Location — Quantity:

Relinquished By:	M. REED	Signature:	M. Reed	Date/Time:	9-24-2024
Received By:		Signature:		Date/Time:	9-25-24 09:35
Relinquished By:	SEP 24 2024 p/o	Signature:		Date/Time:	
Received By:		Signature:	5x3pm 9/24/24	Date/Time:	

RECEIVED BY:

1220 Concord Avenue, Suite 450, Concord, CA 94520 Tel: (510) 547-7771 Fax: (510) 547-1983

SGS Excelchem Laboratories, Inc.

Doug Selby, Technical Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SGS Excelchem Laboratories, Inc.

SGS Forensic Laboratories - Hayward	Project:	NA247122	
3777 Depot Road, Suite 409	Project Number:	U003326	Date Reported:
Hayward, CA 94545	Project Manager:	Nicole Adams	10/01/24 16:11

SGS

SGS - Rocklin
Sample Integrity
FN: F-ROC-SC-001-00
Rev. Date: 11/01/2023
Page 1 of 1

Sample Integrity

WORK ORDER: _____

Date Received: 9/25/24

Company Name: SGS Hayward
New Client: Y (N)

Section 1 – Sample Arrival Information

Sample Transport: ONTRAC UPS USPS Walk-In EXCELCHEM Courier ~~Fed-Ex~~ Other:_____
Transported In: Ice Chest (Box) Hand
Packing materials: Bubble Wrap Foam Packing Peanuts Paper Other:_____
Has chilling process begun? Y (N) **Samples Received:** Chilled to Touch / (Ambient) / On Ice
Temperature of Samples (°C): _____ **Ice Chest Temperature(s) (°C):** _____
Thermometer ID:_____ CF (°C): _____

Section 2 – Bottle/Analysis Info.

	Yes	No	N/A	Comments
Did all bottles arrive unbroken and intact?	✓			
Did all bottle labels agree with COC?				
Were correct containers used for the tests requested?				
Were correct preservations used for the tests requested?				
Was a sufficient amount of sample sent for tests indicated?				
Were bubbles present in VOA Vials?: **(Volatile Methods Only)**				
Is there head space in the VOA vials? **(Volatile Methods Only)**				

Section 3– COC Information

	Yes	No	Comments		Yes	No
COC Received	✓			Analysis Requested	✓	
Date Sampled	✓			Samples arrived within holding time	✓	
Time Sampled		✓		Hold times less than 72 hours		✓
Sample ID	✓			Client Name	✓	
Rush Turn Around Time	✓		3-5	Client Contact Information	✓	

SHORT HOLD LIST (<72 hours)

pH	Chlorine	Corrosivity	Coliform	Dissolved Oxygen	Odor	Nitrate	Nitrite	Ortho-phosphate
MB	Asbestos	Settable Solids	Turbidity	Biochemical Oxygen Demand	HPC	Color	Tedlars	Ammonia/TKN (unpreserved)
As								

Section 4 – Comments / Discrepancies

Client notified of discrepancies: Yes / No **Notified by:**
Comments:

Bin Number/ Location:	B-28
COC Scanned/Attached by:	BM
Samples labeled by:	BM
Sample labels reviewed by:	BM

Filled out by: _____ **Date:** 9/25/24 **Time:** 09:35

SGS Excelchem Laboratories, Inc.

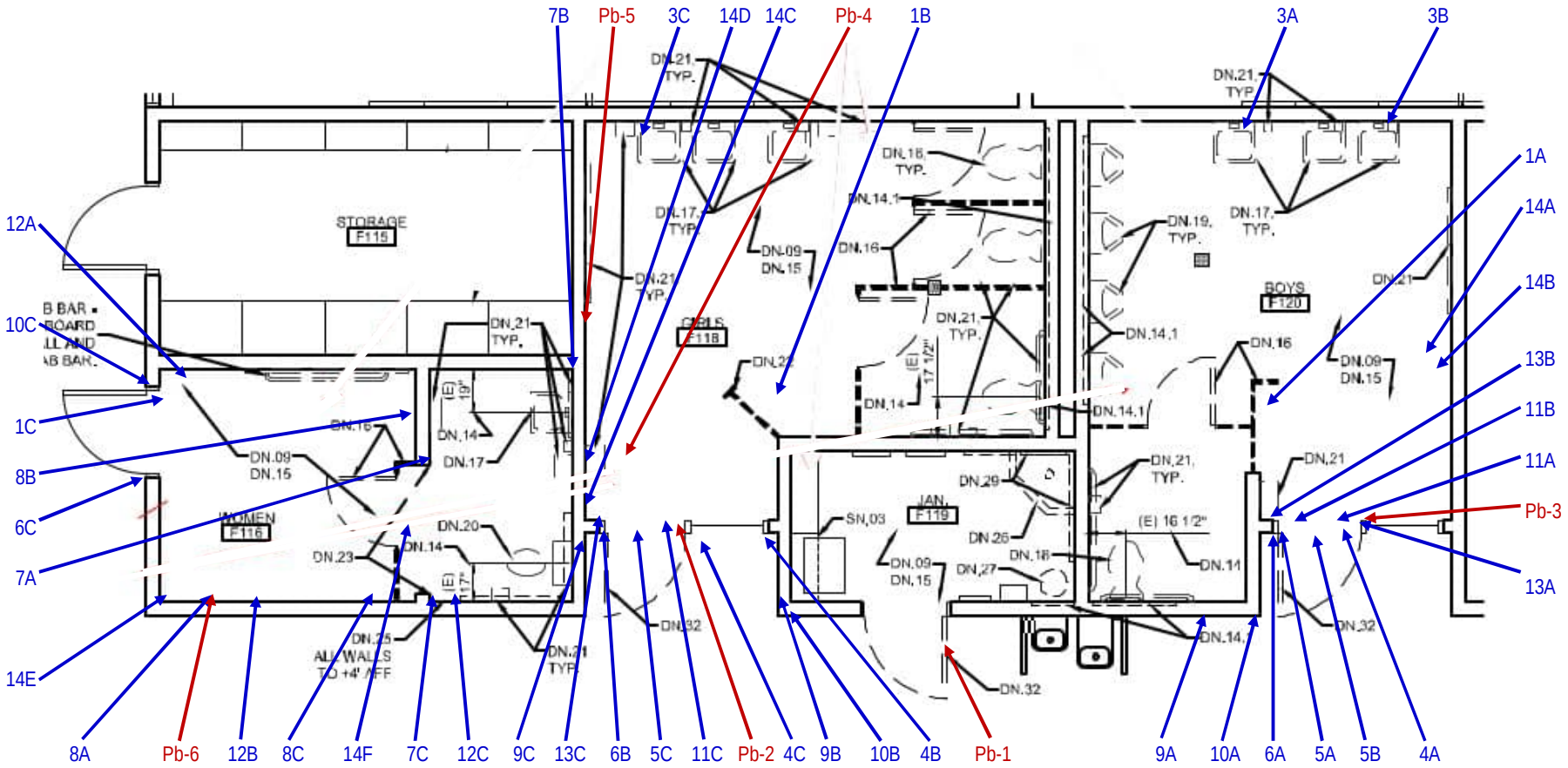
Doug Selby

Doug Selby, Technical Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

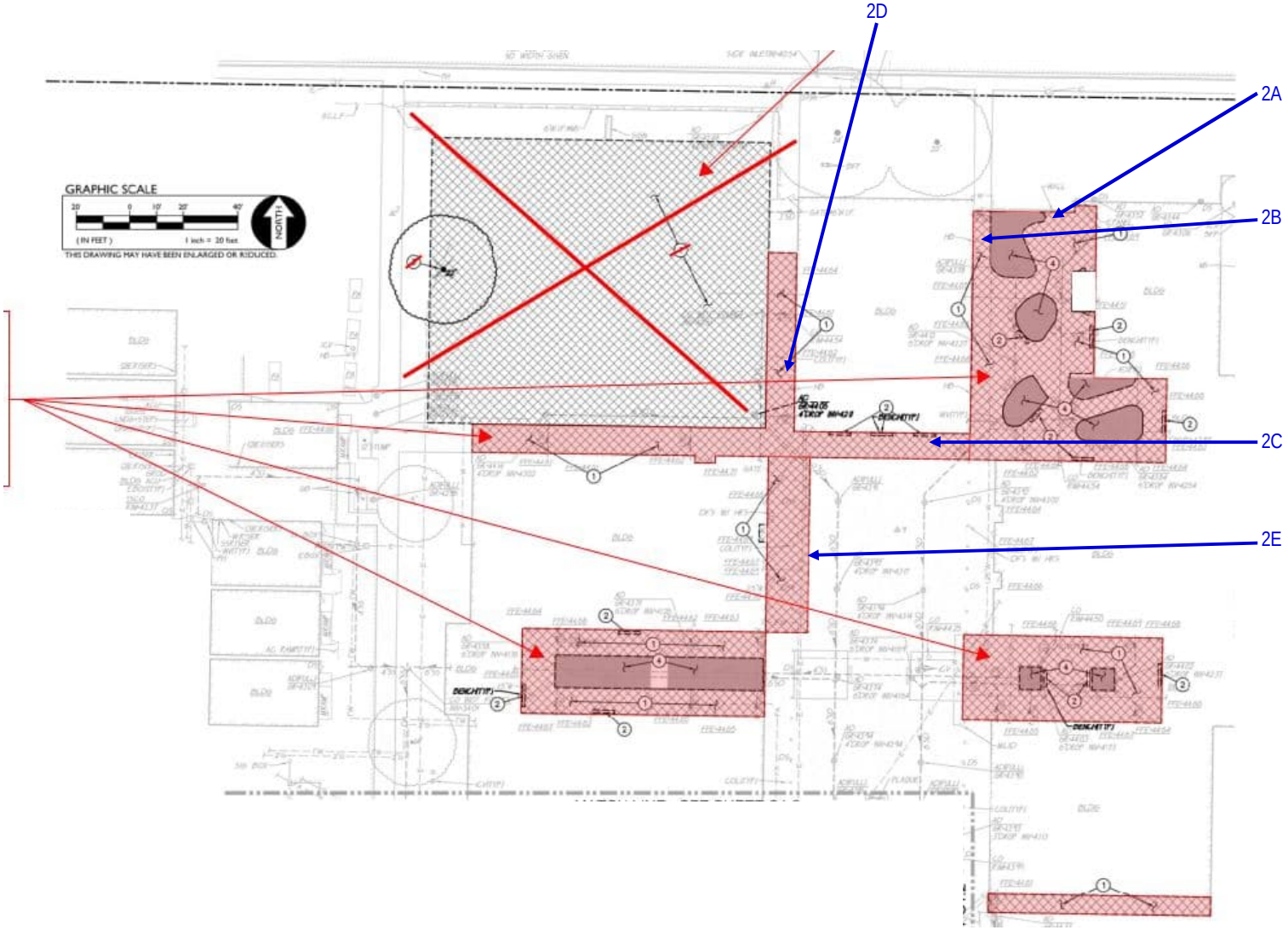
APPENDIX E

SAMPLE AND MATERIAL LOCATION FIGURES



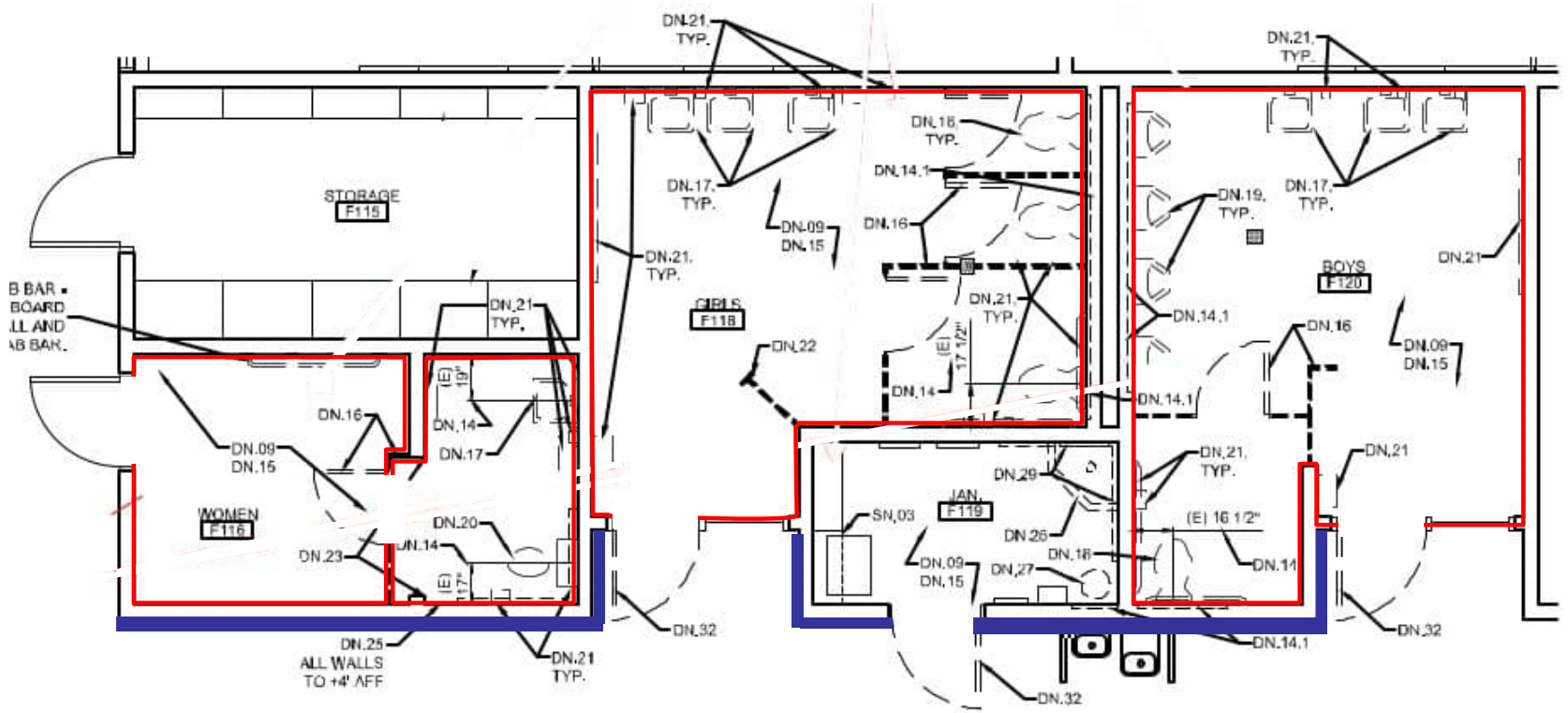
N

Terracon 1220 Concord Avenue, Suite 450, Concord, CA 94520 P (510) 547-7771	Lodi Middle School – Building F Student Restrooms - Sample Locations	945 S Ham Lane Lodi, CA	Drafted By: GV	Not to Scale
	SURVEY DATE: September 23, 2024	PROJECT NO.: NA245056_7122	Checked By: DW	FIGURE: 1



N

Terracon 1220 Concord Avenue, Suite 450, Concord, CA 94520 P (510) 547-7771	Lodi Middle School Concrete Walkways - Sample Locations	945 S Ham Lane Lodi, CA	Drafted By: GV	Not to Scale
	SURVEY DATE: September 23, 2024	PROJECT NO.: NA245056_7122	Checked By: DW	FIGURE: 2



HM 09 / Off-white Exterior Sealant - Brick to Stucco

HM 13 / 4" Light Yellow Ceramic Wall Tile with Grout and Mortar on Drywall with Joint Compound

HM 14 / Drywall with Joint Compound Walls and Ceilings

N

Terracon 1220 Concord Avenue, Suite 450, Concord, CA 94520 P (510) 547-7771	Lodi Middle School – Building F Student Restrooms - ACM Locations	945 S Ham Lane Lodi, CA	Drafted By: GV	Not to Scale
	SURVEY DATE: September 23, 2024	PROJECT NO.: NA245056_7122	Checked By: DW	FIGURE: 1

APPENDIX F

CERTIFICATIONS

State of California
Division of Occupational Safety and Health

Certified Site Surveillance Technician

Michael H Reed

Name



Certification No. **08-4464**

Expires on **12/18/24**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
 **Micheal Reed**	Lead Sampling Technician	LRC-00000224	5/21/2025

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant



Steffen Paul Steiner
Name

Certification No. **92-0850**

Expires on **01/08/25**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
	Lead Inspector/Assessor	LRC-00005586	5/15/2025

Steffen Steiner

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

APPENDIX C

LEAD ANALYTICAL LABORATORY DATA

APPENDIX D

PCB ANALYTICAL LABORATORY DATA

APPENDIX E

SAMPLE AND MATERIAL LOCATION FIGURES

APPENDIX F

CERTIFICATIONS