TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 2 - SITE CONSTRUCTION

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DIVISION 12 - FURNISHINGS

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DIVISION 23 - MECHANICAL

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SECTION 01-100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

The Work of this Contract shall consist of the construction and completion of the project known as CITY OF HEALDSBURG POLICE STATION IMPROVEMENTS RE-BID PROJECT**.**

A. Including but not limited to:

1. Repairs and Improvements at Healdsburg Police Department.

a. New HVAC System(s).

b. Application of roof coating.

c. Waterproofing and gasket replacement of trellis brackets and windows.

d. Installation of new restroom counters and plumbing.

e. Misc. ADA improvements.

f. Electrical modifications

B. All work shown or described in the Contract Documents shall be furnished complete, in-place, and ready for occupancy and use.

1.2 WORK NOT IN CONTRACT

A. All work specifically noted as N.I.C. (Not In Contract) shall not form part of the Work of this Contract, however, if specifically called for in the Contract Documents the Contractor shall be required to coordinate the Work of this Contract with work performed by others.

1.3 QUALITY ASSURANCE

A. The construction in place and all operations on the site and in conjunction with the work of construction shall be done in accordance with the Contract Documents and shall comply with all laws, ordinances, regulations, rules, permits and directives of the governing authorities having jurisdiction over the Work.

B. Manufacturer's Directions: Where Specifications require work to be performed in accordance with manufacturer's directions, the Contractor shall

obtain and distribute copies of said directions to Owner, Architect, and field office prior to starting the affected part of the work.

C. Materials: All materials and equipment incorporated into the Work shall be new, except where re-use of existing materials or equipment is specifically indicated on the Drawings or specified. Materials employed for construction purposes, such as formwork, scaffolding, temporary light fixtures, lamps, piping or wiring shall not be used in the Work.

1. All similar materials and equipment shall be from one manufacturer and shall be the same model, type and style for the same use throughout the Project. This requirement shall apply whether the item is furnished under one, or several sections of the Specifications. Failure to comply with this requirement will be cause for rejection of materials.

D. Unforeseen Conditions: Contractor shall verify all existing conditions and all dimensions at the site prior to beginning work.

1. Should discrepancies concerning existing conditions or dimensions be discovered, the Contractor shall report such discrepancies to the Architect immediately. Do not proceed with work in the area of the discrepancies until they have been resolved to the satisfaction of the Architect and instructions on how to proceed have been issued to the Contractor by the Architect.

E. The presence of the Architect or any of Architect's designated representatives at the job site shall not relieve the Contractor from Contractor's responsibility to control and supervise the performance of the Work or from the manner in which it is safely accomplished.

F. Discrepancies in the Drawings or Specifications shall not relieve the Contractor from performing omitted or misdescribed details of work. Work shall be performed as if fully and correctly described in the Drawings and Specifications.

1.4 WORKMANSHIP

A. All workmanship shall be performed by skilled mechanics in accordance with established standards of first-class workmanship in each of the various trades. All items and all joints and all transitions between items shown to be plumb, level, flat or straight, throughout their entire extent shall be so within limits of tolerances specified. In cases where tolerances are not specified, all items shall be installed in accordance with established standards of first-class workmanship in each trade.

B. Contractor shall, before installing any item or material, verify that surfaces to receive such item or material are plumb, level, true to line and straight to the degree necessary to achieve tolerances specified or required. All shimming, blocking, stripping, grinding or patching required shall be done without additional cost to the Owner.

C. All joints in finish materials shall be tight, straight, even and smooth.

D. All operable items shall operate smoothly, without sticking, binding, or excessive play or looseness.

E. All similar work shall have uniform appearance, and all finished work shall have no unsightly or hazardous protrusions, burrs or sharp edges, and shall have appropriate provisions for expansion and contraction.

F. All finish surfaces shall be free of bubbles, streaks, peeling, pits, chips, dents, cracks, stains or excessive sealant.

1.5 MARSHALING AREA

A. Contractor's parking and marshaling areas shall be as directed by the Owner. The Contractor shall limit Contractor's parking and marshaling activities to the areas indicated, and shall limit the activities of all workers on the project within the limit of work, unless specific permission is granted by the Owner. Contractor shall not use any existing building on campus for storage, unless specific permission is granted by the Owner.

1.6 DOCUMENTS REQUIRED AT JOB SITE

A. One copy of all Contract Documents, complete and in good order shall be kept at the job site and available to the Architect at all times. Contractor shall also keep all shop and setting drawings and all modifications and clarifications to the Contract Documents complete and in good order and available to the Architect at the job site at all times.

END OF SECTION

SECTION 01-2300 – BID ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. The work described in the drawings and specifications specifically delineated as bid alternate work. All other work on the drawings not designated as alternate work is considered Base Bid work.

1.2 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's Option. Accepted alternates will be identified in the Owner-Contractor agreement.

B. Coordinate related work and modify associated or surrounding work to fully integrate the inclusion or exclusion of Bid Alternates.

1.3 BASE BID WORK

A. All work indicated on the specifications and drawings excepting add Alternate One.

1.4 SCHEDULE OF ALTERNATES

A. Alternate One (1) (Additive): Provide and install Fan Coil unit FC-11 and Condensing Unit CU-11.

PART 2 - PRODUCTS AND PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01-3100 - PROJECT COORDINATION MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:

1. Pre-Construction Conference.
2. Pre-Installation Conferences.
3. Coordination Meetings.
4. Progress Meetings.

B. Construction schedules are specified in another Division-1 Section.

1.3 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement unless otherwise directed by the School District Project Manager. Conduct the meeting to review responsibilities and personnel assignments.

B. Attendees: The School District Project Manger and Representatives, the Architect, DSA Inspector, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule.
2. Critical Work sequencing.
3. Designation of responsible personnel.

4. Procedures for processing field decisions and Change Orders.

5. Procedures for processing Applications for Payment.

6. Distribution of Contract Documents.

7. Submittal of Shop Drawings, Product Data and Samples.

8. Preparation of record documents.

9. Use of the premises.

10. Office, Work and storage areas.

11. Equipment deliveries and priorities.

12. Safety procedures.

13. First aid.

14. Security.

15. Housekeeping.

16. Working hours

17. Duties and Relationship with Project Inspector and the Division of State Architect (DSA)

18. Reports and documentation required by DSA and the District.

1.4 PRE-INSTALLATION CONFERENCES

A. Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The 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 the Architect and School District Project Manager of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:

a. Contract Documents.

b. Options.

c. Related Change Orders.

d. Purchases.

e. Deliveries.

f. Shop Drawings, Product Data and quality control Samples.

g. Possible conflicts.

h. Compatibility problems.

i. Time schedules.

j. Weather limitations.

k. Manufacturer's recommendations.

l. Compatibility of materials.

m. Acceptability of substrates.

n. Temporary facilities.

o. Space and access limitations.

p. Governing regulations.

q. Safety.

r. Inspection and testing requirements.

s. Required performance results.

t. Recording requirements.

u. Protection.

1.5 COORDINATION MEETINGS

A. Conduct Project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 PROGRESS MEETINGS

A. Conduct progress meetings at the Project site at regularly scheduled intervals. Notify Architect and School District Project Manager of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.

B. Attendees: In addition to representatives of the School District and Architect, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind 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.

2. Review the present and future needs of each entity present, including such items as:

a. Interface requirements.

b. Time.

c. Sequences.

d. Deliveries.

e. Off-site fabrication problems.

f. Access.

g. Site utilization.

h. Temporary facilities and services.

i. Hours of Work.

j. Hazards and risks.

k. Housekeeping.

l. Quality and Work standards.

m. Change Orders.

n. Documentation of information for payment requests.

D. Reporting: The School District Project Manager will compile and distribute minutes after each progress meeting date for the next progress meeting, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

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

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01-3200 - PROJECT PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: To assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract, prepare and maintain the schedules and reports described in this Section.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. Requirements for progress schedule: General Conditions.

3. Construction period: Form of Agreement.

C. Definitions:

1. "Day," as used throughout the Contract unless otherwise stated, means "calendar day."

1.2 QUALITY ASSURANCE

A. Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data, and in preparing and issuing periodic reports as required below.

B. Perform data preparation, analysis, charting, and updating in accordance with standards approved by the Architect.

C. Reliance upon the approved schedule:

1. The construction schedule as reviewed by the Architect will be an integral part of the Contract and will establish interim completion dates for the various -activities under the Contract.

2. Should any activity not be completed within 15 days after the stated scheduled date, the Owner shall have the right to require the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor.

3. Should any activity be 30 days or more behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner deems appropriate.

4. Costs incurred by the Owner and by the Architect in connection with expediting construction activity under this Article shall be reimbursed by the Contractor.

5. It is expressly understood and agreed that failure by the Owner to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. 'As-planned' Construction Schedule: Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit one reproducible copy and four prints of a preliminary construction schedule prepared in accordance with Part 3 of this Section.

C. Construction schedule: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit one reproducible copy and three prints of a construction schedule prepared in accordance with Part 3 of this Section.

D. Periodic reports: On the first working day of each month following the submittal described in Paragraph 1.3-C above, submit three prints of the construction schedule updated as described in Part 3 of this Section. Monthly Pay Request processing by the Architect is contingent upon receipt and approval of the updated construction schedule.

1.4 SCHEDULE

A. The schedule for construction shall be as indicated in the contract for construction.

1.5 STORAGE OF MATERIALS

A. All work, storage of materials, and vehicle parking shall take place only within the fenced in areas designated by the District Representative.

B. Workmen may not park outside the designated building construction area.]

1.6 SITE ACCESS

A. All ingress and egress to the work area shall be as designated by the Owners Representative.

1.7 MEETINGS

A. Weekly job site meetings attended by Contractor, related subcontractors, Architect, Project Inspector, and Owner's Representative will be held. Meeting agenda will review progress, schedule and address all Project-related issues. A reduced schedule of meetings may be instituted at certain project phases upon mutual agreement of the Architect, Project Inspector and Owner.

1.8 CONTRACTOR'S CONDUCT DURING THE CONSTRUCTION PERIOD

A. The Project site may be occupied by City staff or patrons during the construction period. At the beginning of the project for each construction site, a meeting will be held between the City's representative and the construction superintendent to discuss the District's policies regarding smoking, dress, construction parking, contact between staff, students and workman and other issues affecting the educational/ construction interface.

1.9 ADVERSE WEATHER EXTENSIONS.

A. As described in the General Conditions extensions of time for adverse weather conditions may be granted for days which are in excess of the average number of days considered normal for the project location. The following chart lists the normal number of adverse weather days for the job location. Adverse weather is defined as weather conditions resulting in a cessation of the progress of the work which will delay the time of completion of the contract.

AVERAGE NUMBER OF ADVERSE WEATHER DAYS: FOR HEALDSBURG, CALIFORNIA

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	8	7	4	2	1	0	0	1	2	6	8

Source: *http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3875*

PART 2 - PRODUCTS

2.1 CONSTRUCTION ANALYSIS

A. Graphically show by bar-chart the order and interdependence of all activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field

superintendent in coordination with all subcontractors whose work is shown on the diagram.

B. Include, but do not necessarily limit indicated activities to:

1. Project mobilization;

2. Submittal and approval of Shop Drawings and Samples;

3. Procurement of equipment and critical materials:

4. Fabrication of special material and equipment, and its installation and testing.

5. Final cleanup;

6. Final inspecting and testing; and

7. All activities by the Architect that affect progress, required dates for completion, or both, for all and each part of the Work.

8. Account for 'Normal' number of rain days per month as recorded in a 10-year average by the local water agency or other pubic agency {Mendocino County Water Agency) keeping records for at least 10 years, or otherwise stated in the above table. These days are not eligible for weather delay claims

PART 3 - EXECUTION

3.1 'AS-PLANNED' SCHEDULE

A. Contents:

1. Show all activities of the Contractor under this Work for the period between receipt of Notice to Proceed and submittal of construction schedule required under Paragraph 1.3-C above;

2. Show the Contractor's general approach to remainder of the Work;

3. Show cost of all activities scheduled for performance before submittal and approval of the construction schedule.

B. Submit in accordance with Paragraph 1.3-B above.

3.2 CONSTRUCTION SCHEDULE

A. The Contractor shall provide a construction schedule in accordance with the General Conditions, Section 20. The Contractor shall include in this schedule the average rain days in accordance with 2.1B (8) above.

B. The original construction schedule shall include, in addition to the Contractor's normal categories, the following:

1. Milestones for submittals, shop drawings and substitution requests;

2. DSA deferred approvals;

3. Rain days indicated in Paragraph (3.2-A) above;

4. Milestones for connections to utilities;

5. Milestone for completion of the vehicular paved areas and drainage system;

6. Milestone for completion of each individual building;

7. Milestones for initial punch list walk through;

8. Schedule for geotechnical consultant to be on site for observation and testing;

9. Milestones for testing lab to obtain material samples and observe required fabrications;

10. Project Record Document completion.

C. The original construction schedule shall be termed the "As-Planned" schedule and shall not be modified. Required updates to the schedule shall be termed "As-Built" schedules and shall be done on a separate line on the schedule, adjacent to the " As- Planned" schedule for comparison. Schedule modifications due to approved change orders or delay claims shall be indicated on the " As- Built" schedule as they occur.

D. Schedules shall be comprehensive enough to determine daily activities, trade responsible for the activity, and individual area or building the activity will occur at, on any given day.

E. Each trade listed on the Designation of Subcontractors form and the Schedule of Values form shall be identified in the construction schedule.

F. Submit in accordance with Paragraph 1.3-C above.

3.3 PERIODIC REPORTS

A. As required under Paragraph 1.3-D above, update the approved construction schedule.

1. Indicate " actual" progress in percentage of completion for each activity;

2. Provide written narrative summary of revisions causing delay in the program, and an explanation of corrective actions taken or proposed.

3.4 REVISIONS

A. Make only those revisions to approved construction schedule as indicated by the Architect.

END OF SECTION

SECTION 01-3300 - SUBMITTALS AND SHOP DRAWINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:

1. Contractor's construction schedule.
2. Submittal schedule.
3. Shop Drawings.
4. Product Data.
5. Samples.
6. Daily Construction Report.

B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Applications for payment.
2. Performance and payment bonds.
3. Insurance certificates.
4. List of Subcontractors.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

    a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmits.

    a. Allow Fourteen days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

    b. If an intermediate submittal is necessary, process the same as the initial submittal.

    c. Allow fourteen days for reprocessing each submittal.

    d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.

    a. Project name.

    b. Date.

c. Name and address of Architect.

d. Name and address of Contractor.

e. Name and address of subcontractor.

f. Name and address of supplier/manufacturer.

g. Submittal number (Descending). Identify secondary submittals by letter suffix.

h. Number and title of appropriate Specification Section.

i. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to City representative using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

1. On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Within 15 calendar days after Notice to Proceed, the Contractor shall submit to School District Representative for approval 3 copies of his construction schedule showing in detail the proposed sequence of activities.

B. The construction schedule shall consist of a critical path (CPM) network, a computer printout, and an analysis showing the order in which the Contractor proposes to carry out the Work, and the dates on which he will start and complete the salient features thereof, including procurement of materials, plant, and equipment.

C. The CPM Schedule shall use an activity on arrow or precedence method of network diagramming and shall conform to the following requirements of the Conditions of the Contract:

1. The specified Time for the completion of the Work.

2. Show a reasonable and orderly work sequence that will preclude excessive or inadequate times for completion of any part thereof.

3. Show and be in accordance with the order, fabrication, and delivery dates for equipment and materials.

4. Show submittal of shop drawing and review by City as specified herein.

5. Show construction milestones, including inspections, and critical path events.

6. The CPM Schedule shall be subject to the approval of, and modification by, the Architect or School District Project Manager.

D. The CPM Schedule shall be updated monthly to represent the actual history of accomplishment of all activities as well as the Contractor's current projected plan for orderly completion of the Work. The Contractor shall submit a monthly evaluation of the critical path analysis including the following:

1. Percentage of activity completed.

2. Anticipated completion time of entire work.

3. Description of problem areas.

4. Current and anticipated delaying factors and their impact.

5. Explanation of corrective action taken or proposed.

E. Cost Correlation: At the head of the schedule, provide a two item cost correlation line, indicating "precalculated" and "actual" costs. On the line show dollar-volume of Work performed as of the dates used for preparation of payment requests.

1. Refer to Section "Applications for Payment" for cost reporting and payment procedures.

F. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, School District Project Manager, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

1. When revisions are made, distribute 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 construction activities.

G. A revised schedule shall be submitted when one or more of the following conditions occur:

1. Progress falls significantly behind schedule and the School District Project Manager requests a revised schedule.

2. A Change Order affects the Contract Time or the sequence of activities.

3. The Contractor elects to change any sequence of activities affecting the critical path.

4. Delay of a non critical activity changes the course of the critical path.

H. The submission of a revised schedule will not relieve the Contractor of his responsibility to provide notice of delay.

1.5 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:

a. Scheduled date for the first submittal.

b. Related Specification Section number.

c. Submittal category.

d. Name of subcontractor.

e. Description of the part of the Work covered.

f. Scheduled date for resubmittal.

g. Scheduled date the Architect's final release or approval.

B. Distribution: Following response to initial submittal, print and distribute copies to the Architect, School District Project Manager, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

1. When revisions are made, distribute 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 construction activities.

C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

1. Dimensions.

2. Identification of products and materials included.

3. Compliance with specified standards.

4. Notation of coordination requirements.

5. Notation of dimensions established by field measurement.

6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 30" x 42".

7. Initial Submittal: Submit one correctable translucent reproducible print and three blue- or black-line print for the Architect's review; the reproducible print and two paper prints will be returned.

8. Re Submittal: Submit prints as stated above.

9. The contractor shall keep one of the returned stamped prints at the site to be maintained and marked-up as a Record Document.

10. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.7 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

a. Manufacturer's printed recommendations.

b. Compliance with recognized trade association standards.

c. Compliance with recognized testing agency standards.

d. Application of testing agency labels and seals.

e. Notation of dimensions verified by field measurement.

f. Notation of coordination requirements.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3. Submittals: Submit Six (6) copies of each required submittal. The Architect will retain two, and will return the other marked with action taken and corrections or modifications required.

a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

4. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.

b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.8 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample. Include the following:

a. Generic description of the Sample.

b. Sample source.

c. Product name or name of manufacturer.

d. Compliance with recognized standards.

e. Availability and delivery time.

2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.

b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.

3. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.

4. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

1.9 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Architect at weekly intervals:

1. List of subcontractors at the site.
2. Approximate count of personnel at the site.
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.
6. Stoppages, delays, shortages, losses.
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and start-ups.
13. Partial Completions, occupancies.
14. Substantial Completions authorized.

PART 2 - PRODUCTS (NOT APPLICABLE).

PART 3 - EXECUTION

3.1 ARCHITECT'S REVIEW

A. Except for submittals for record, information or similar purposes, where no action is taken and return is not required or requested, the Architect and their

consultants, will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect, and appropriate consultants, will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. No Exceptions Taken: Where submittals are marked "No Exceptions Taken," that part of the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. Make Corrections Noted: When submittals are marked "Make Corrections Noted," that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. When other notation is indicated, do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark. Do not permit submittals marked "Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

C. Revisions:

1. Make revisions required by the Architect.

2. If the Contractor considers any required revision to be a change, he shall so notify the Architect as provided for in the Contract Documents.

3. Make only those revisions directed by the Architect

3.2 PROJECT INSPECTOR

A. The Architect will provide the Project Inspector with reviewed copies of all shop Drawings and Manufactures brochures for use on the job site.

END OF SECTION

SECTION 01-3370 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. Provide a detailed breakdown of the agreed Contract Price showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. Schedule of values is required in the General Conditions.

3. Schedule of values is required to be compatible with the "continuation sheet" accompanying applications for payment.

1.2 QUALITY ASSURANCE

A. Use required means to assure arithmetical accuracy of the sums described.

B. When so required by the Architect, provide copies of the subcontracts or other data acceptable to the Architect, substantiating the sums described.

1.3 SUBMITTALS

A. 15 calendar days after Notice to Proceed, submit a proposed schedule of values to the Architect.

1. Schedule of Values shall be itemized separately per site cost and each individual buildings and subtotaled by the 16 C.S.I. Divisions. General conditions, profit and overhead shall be distributed on a per sq. foot basis, unless contractor has specific costs documented exclusive to one or more building subtotal.

2. The Architect will review the schedule of values prior to submitting first application for payment.

END OF SECTION

SECTION 01-3510 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED:

A. Coordinate work of trades and schedule elements of alteration and renovation work by procedures and methods to expedite completion of the Work.

B. In addition to demolition specified in Section 02-4116 and 02-4119, and that specifically shown, cut, move, or remove items as necessary to provide access to or allow alterations and new work to proceed. Include such items as:

1. Investigation, identifying and permanent labeling of above ground utilities and services to remain and those to be removed.

2. Repair or removal of hazardous or unsanitary condition.

3. Removal of abandoned items or items serving no useful purpose, such as abandoned piping, conduit, wiring, and ducting which conflict directly with the construction of new work.

4. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings, equipment, pumps, boiler, walkways, and debris etc. such as rotted wood, rusted metals and deteriorated concrete which are uncovered during the construction work

5. Cleaning of surfaces, and removal of surface finished as needed to install new work and finishes as noted and called for in the plans and specifications.

C. Patch, repair, and refinish existing items to remain, to the specified condition for each material, with a workmanlike transition to adjacent new items of construction.

1.2 RELATED REQUIREMENTS

A. Section 02-4116 - Structure Demolition

B. Section 02-4119 - Selective Demolition

1.3 ALTERATIONS, CUTTING, AND PROTECTION

A. Assign the work of moving, removal, cutting and patching, to trades qualified to perform the work in a manner to cause least damage to each type of work, and provide means of returning surfaces to appearance of new work.

B. Perform cutting and removal work to remove minimum necessary, and in a manner to avoid damage to adjacent work.

1. Cut finish surfaces such as roofing and siding, by methods to terminate surfaces in straight line at a natural point of division. Shingle in, patch and stagger joints so as to provide a final finished appearance that is water tight in every way.

C. Perform cutting and patching as specified in Section 02-4119 Selective Demolition.

D. Protect existing finishes, equipment, and adjacent work scheduled to remain, from damage.

1. Protect existing and new work from weather and extremes of temperature.

a. Maintain existing interior work above 60 degrees F.

b. Provide weather protection, waterproofing, heat and humidity control as needed to prevent damage to remaining existing work and to new work.

PART 2 - PRODUCTS

2.1 PRODUCTS FOR PATCHING, EXTENDING, AND MATCHING

A. General requirements that work be completed:

1. Provide same products or types of construction as that in existing items as needed to patch, extend or match existing work.

a. Generally, contract documents will not define products or standards of workmanship present in existing construction; Contractor shall determine products by inspection and any necessary testing, and workmanship by use of the existing as a sample of comparison. Existing construction shall be verified on site prior to the beginning of demolition or remodel work.

2. Presence of a product, finish, or type of construction, requires that patching, extending or matching shall be performed as necessary to make the work complete and consistent to identical standards of quality.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Patch and extend existing work using skilled mechanics who are capable of matching existing quality of workmanship. Quality of patched or extended work shall be not less than that specified for new work.

3.2 DAMAGED SURFACES

A. Patch and replace any damaged portion of an existing finish surface adjacent to new work with matching material.

1. Provide adequate support of substrate prior to patching the finish.

2. Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over entire surface.

3.3 TRANSITION FROM EXISTING TO NEW WORK

A. When new work abuts or finished flush with existing work, make a smooth and workmanlike transition. Patched work shall match existing adjacent work in texture and appearance so that the patch or transition is invisible and final approval shall be as per the Architect's judgment.

1. When finished surfaces are cut in such a way that smooth transition with new work is not possible, terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface. Consult Architect for instruction to proceed if a smooth transition is not possible.

3.4 CLEANING

A. Perform periodic cleaning as required to maintain a safe workmanship environment during construction duration. See Section 01700 for final cleaning.

1. Clean spillage, over-spray, and collection of other foreign materials. Contractor shall not allow dust caused from work to penetrate into areas occupied by the Owner.

B. At completion of work of each trade, clean area and make surfaces ready for work of successive trades.

C. At completion of alteration work in each area, provide final cleaning and return space to a condition suitable for use by Owner, and as approved by the Architect.

END OF SECTION 01-3510

SECTION 01-4000 - REQULATORY REQUIREMENTS AND REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DOCUMENTS

A. The General Conditions, Supplementary Conditions and applicable portions of Division 1 of the specifications are part of this section.

1.2 CODES, ORDINANCES AND REGULATIONS

A. The contractor shall be knowledgeable of and comply with all applicable codes, ordinances and regulations having jurisdiction over the work of this project.

B. California Code of Regulations, Title 24, Part 1, 2, 3, 4, 5 and 9, 2013 editions.

C. California Building Code 2013 edition

D. California Mechanical Code 2013 edition

E. California Plumbing Code 2013 edition

F. California Electrical Code 2013 edition

G. California Fire Code 2013 edition

H. California Green Code 2013 edition

I. American with Disabilities Act Accessibilities Guidelines

J. Applicable Safety Standards: References herein to "CAL/OSHA" shall mean State of California, Department of Industrial Relations, Construction Safety Orders, as amended to date, and all change and amendments thereto

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 4200 -QUALITY CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Installation Control and Coordination.

B. Tolerances

C. Standards by Reference

D. Mock-ups

E. Testing and Inspection Services

F. Manufacturer's field services and reports

1.2 RELATED WORK:

A. Inspections and testing required by laws, ordinances, rules, regulations, orders, or approvals of public authorities. Requirements for testing may be described in various sections of these specifications.

B. Respective Sections of Specifications: Certification of products.

C. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing be performed under pertinent standards for testing. Payment for such special testing will be made by the Owner to reimburse the general contractor for extra services.

1.3 WORK NOT INCLUDED:

A. Selection of Testing Laboratory: The Owner will select a pre-qualified independent testing laboratory for use on the project.

1.4 QUALITY ASSURANCE:

A. The testing laboratory Employed by the District will be qualified in accordance with ASTM E329.

B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

C. General Contractor to monitor quality control over suppliers, manufacturers, products, site conditions and workmanship to produce the Work at the specified quality.

1. Correct work that does not meet specified standards of workmanship or quality.

D. Comply with manufacturer's instructions for installation of products in the sequence stipulated by the manufacturer.

1. Where Manufacturer's instructions conflict with the Contract Documents, request clarification in writing from Architect prior to proceeding.

E. When products or construction is in place secure with positive anchorage to prevent vibration or physical distortion

1.5 TOLERANCES:

A. Where Contract documents do not stipulate tolerances comply with manufacturer's tolerances.

1. Where Manufacturer's tolerances conflict with the Contract Documents, request clarification in writing from Architect prior to proceeding.

B. Monitor tolerances of installed assemblies to assure tolerances do not accumulate or compound.

1.6 REFERNCES:

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. The contractual relationships, duties, and responsibilities of the parties in Contract or those of the Architect/Engineer shall not be altered from the Contract Documents by mention or inference otherwise in any reference document

1.7 TESTING AND INSPECTION SERVICES:

A. Owner will appoint, employ, and pay for specified services of an independent Testing and Inspection Agency to perform inspecting and testing as specified in Section 01410, related sections of other divisions referencing this section, and the General Conditions.

B. Contractor to request Owner's Representative to schedule inspections a minimum of **48 hours in advance** of desired inspection.

1.8 MANUFACTURER'S FIELD SERVICES:

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, and to initiate instructions when necessary.

PART 2 - PRODUCTS

REFER TO SECTION 1410 – TESTING AND LABORATORY SERVICES

PART 3 - EXECUTION

REFER TO SECTION 1410 – TESTING AND LABORATORY SERVICES

END OF SECTION

SECTION 01-4523 - TESTING AND LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. Cooperate with the Owner's selected testing agency and all others responsible for testing and inspecting the Work.

2. Provide such other testing and inspecting as are specified to be furnished by the Contractor in this Section and/ or elsewhere in the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division I of these Specifications.

2. Requirements for testing may be described in various Sections of these Specifications.

3. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this Section.

C. Work not included:

1. Selection of testing laboratory: The Owner will select a pre-qualified independent testing laboratory.

2. Payment for initial testing: The Owner will pay for all initial services of the testing laboratory as further described in Article 2.1 of this Section.

1.2 REFERNCES:

A. ASTM C802 - Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction.

B. ASTM C1021 - Practice for Laboratories Engaged in the Testing of Building Sealants.

C. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

D. ASTM C1093 - Practice for Accreditation of Testing Agencies for Unit Masonry. ASTM 0290 - Recommended Practice for Bituminous Mixing Plant Inspection.

E. ASTM 03740 - Practice for Evaluation of Agencies Engaged in Testing *and/or* Inspection of Soil and Rock as Used in Engineering Design and Construction.

F. ASTM 04561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.

G. ASTM E329 - Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.

H. ASTM E543 - Practice for Determining the Qualification of Nondestructive Testing Agencies.

I. ASTM E548 - Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies.

J. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.3 SELECTION AND PAYMENT

A. Owner's independent testing laboratory shall perform inspections, tests, and other services as specified by various specification sections.

1. Owner will employ and pay for testing laboratory to provide initial testing indicated under specific specification sections and specifically noted to be paid by the Owner.

2. Contractor shall pay for testing when:

3. Additional tests and inspections by Owner's testing agency where initial tests and inspections reveal failure to meet Contract requirements.

4. Excessive inspection time by Owner's testing agency is required by Contractor's failure to provide sufficient workman or to properly pursue the progress of work.

5. Test(s) deemed necessary by the Owner/Architect to evaluate any substitution proposed by the Contractor.

6. Testing and inspection for the Contractor's convenience.

7. Testing and inspection overtime necessitated by the Contractor's schedule.

B. Employment of inspection firm in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Employment of any testing laboratory by Contractor shall be subject to Owner approval; laboratory shall be under direct supervision of a registered Engineer and shall conform to ASTM 329. Laboratory of concrete producer shall not be acceptable for concrete mix designs.

D. Owner reserves the right to test any material or work of Project at any time, whether or not tests are indicated in Contract Documents.

1.4 QUALITY ASSURANCE

A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

1.5 TESTING AGENCY RESPONSIBILITIES:

A. Comply with pertinent provisions of Section 01640.

B. Promptly process and distribute required copies of test reports and related instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

C. Promptly notify Architect/Engineer the Inspector of Record and Contractor of observed irregularities or non-conformance of Work or Products

D. After each test, observation or inspection, promptly prepare a Report to include the following:

1. Date issued.

2. Project title and number.

3. Name of inspector.

4. Date and time of sampling or inspection.

5. Identification of product and specifications section.

6. Location in the Project.

7. Type of inspection or test.

8. Date of test.

9. Results of tests.

10. Conformance with Contract Documents.

E. Unless noted otherwise, copies of test results shall be distributed to the following :

1. Owner

2. Contractor

3. Architect

4. Structural Engineer

5. DSA

6. Inspector of Record

1.6 LIMITS OF TESTING AND INSPECTION AUTHORITY

A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency or laboratory may not approve or accept any portion of the Work.

C. Agency or laboratory may not assume any duties of Contractor. D. Agency or laboratory has no authority to stop the Work.

1.7 CONTRACTOR RESPONSIBILITIES:

A. Provide information regarding activities requiring special inspection and tests to District's inspection and testing laboratory upon request.

B. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

C. Cooperate with laboratory personnel, and provide access to the Work.

D. Provide incidental labor and facilities:

1. To provide access to Work to be tested.

2. To obtain and handle samples at the site or at source of Products to be tested.

3. To facilitate tests.

4. To provide storage and curing of test samples.

E. Request the Inspector of Record, in writing, **forty-eight (48) hours prior to expected time** for operations requiring testing services. Become familiar with time constraints of tests required. Schedule work to allow time for performance of required tests.

F. Employ services of an independent qualified testing laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.

1.8 ARCHITECT'S RESPONSIBILITIES

A. Architect is not responsible for notification of the Testing Agency or scheduling its work.

B. Architect will not be responsible for the actions of the Testing Agency.

1.9 RE-TESTING

A. When initial tests indicate non-compliance with the Contract Documents, subsequent re-testing shall be performed by the same testing laboratory and the costs thereof shall be paid by the Owner and deducted from the Contract Sums owed to the Contractor.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 COOPERATION WITH TESTING LABORATORY

A. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.2 TAKING SPECIMENS

A. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

3.3 SCHEDULES FOR TESTING

A. Establishing schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide all required time within the construction schedule.

B. Revising schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule: When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

3.4 TESTING AND INSPECTION REPORT

A. The initial scope of the testing services required shall be as indicated on the T & I Form which follows this section.

END OF SECTION

SECTION 01-4525 - TESTING CONCRETE FLOOR FOR MOISTURE AND PH

PART 1 - GENERAL

1.1 SUMMARY

A. A. Section Includes:

1. Concrete moisture content testing using relative humidity method.

2. Concrete pH testing.

1.2 RELATED REQUIREMENTS

A. Division 09 flooring sections specifying flooring and accessories requiring moisture and pH testing.

1.3 REFERENCES

A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code 2012, with 2013 California Amendments.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division I Section "Project Management and Coordination.'

B. Scheduling: Schedule work to permit concrete moisture testing to be completed minimum one week and maximum 3 weeks before floor coverings are installed.

1.5 SUBMITTALS

A. Product Data:

1. Submit data indicating model, manufacturer, and calibration record for relative humidity measuring equipment.

2. Submit data for floor slab treatment products.

B. Shop Drawings:

1. Indicate test locations shown on building floor plan,

C. Informational Submittals

1. Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for concrete moisture acceptable limits. Report test results in chart form.

a. Relative Humidity Test Method: Indicate test dates, time, depth of test well, in-situ temperature, relative humidity and pH levels.

b. Submit record of ambient air temperature, ambient relative humidity, and floor slab surface temperature when test sites are prepared, start of test, and end of test.

c. Indicate condition of building enclosure including position of operable windows and exterior doors when test sites are prepared, start of test, and end of test.

d. Submit transcript of datalogger.

e. Indicate operational status of HVAC systems maintaining environmental condition of spaces where tests are conducted when test sites are prepared, start of test, and end of test.

1.6 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not perform concrete moisture testing until building is enclosed and the HVAC system is operational.

2. Maintain building test areas at design operating conditions for minimum 48 hours before, during, and continuously after conducting testing.

3. When permanent HVAC system is not operational at start of tests, A temporary system may be utilized to maintain ambient conditions within test areas at 65 to 85 degrees F and 40 to 60 percent relative humidity for minimum 48 hours before, during, and continuously after conducting testing until building HVAC system is capable of maintaining design operating conditions.

PART 2 - PRODUCES

2.1 RELATIVE HUMIDITY TEST EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Vaisala www.vaisala.com.

2. Wagner Moisture Meters, Rapid RH, www.wagnermeters.com.

3. Substitutions: Section 01-6000.

B. Humidity and Temperature Probe and Meter: Comply with ASTM F2170.

2.2 PH TEST MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Micro Essential Laboratory www.microessentiallab.com.

2. Substitutions: Section 01-6000.

B. pH Test Paper: Capable of indicating minimum 7.0 to 13 pH range.

C. pH Color Gage: Furnish pH test paper manufacturer's visual color gage to identify measured pH.

D. Water: Distilled or de-ionized.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify new concrete floors have cured minimum 28 days.

3.2 PREPARATION

A. When a building HVAC system is not operational and maintaining test areas at design operational conditions, install recording hygrometer or data logger in each separate test area to record ambient temperature and relative humidity beginning 48 hours before start of tests until completion of tests within each area.

B. Identify three moisture test sites for first 1,000 sf and one moisture test site for each additional 1,000 sf of floor area receiving floor covering on each separate floor slab.

1. Layout test site locations uniformly distributed throughout each test area.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform concrete moisture tests and inspections and prepare test reports.

B. Acceptance Criteria:

1. Concrete floor slabs will be considered acceptable for installation of floor finishes when the following results are obtained at HVAC design operating conditions:

a. Relative Humidity Test Result 75 percent maximum relative humidity.

b. pH Test Result Within alkalinity range of 7.0 to 9.0.

2. When concrete floors do not meet acceptance criteria, apply coating per related Section "Water Vapor Emission Control System".

C. Concrete Moisture Testing - General

1. Conduct relative humidity test at each test site.

2. Conduct one pH test at each test site.

D. Relative Humidity Testing:

1. Perform tests in accordance with ASTM F2170.

2. Conduct relative humidity testing at the following depths:

a. Slabs-On-Grade: Measure temperature and relative humidity at 40 percent of slab thickness measured from top surface.

b. Elevated Slabs: Measure temperature and relative humidity at 20 percent of slab thickness measured from top surface.

3. Drill test hole at each test site to accommodate test sleeve.

a. Hole Diameter: In accordance with test equipment manufacturer's instructions.

b. Drilling Fluids: Not permitted.

4. Vacuum dust and debris from test hole.

5. Insert sleeve, to the full depth of test hole. Cap or plug sleeve to prevent test hole contamination.

6. Permit the test site to acclimate for minimum 72 hours before measuring relative humidity.

7. Remove sleeve plug and insert probe to bottom of test hole. Allow test probe to reach temperature equilibration with concrete slab.

8. Measure and record temperature and relative humidity at the test site.

E. pH Testing-

1. Place several drops of water onto the concrete surface to form a puddle approximately 1 inch in diameter.

2. Allow the water to set for approximately 60 seconds

3. After 60 seconds, dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading.

4. Record and report results.

END OF SECTION

SECTION 01-5000 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

B. Temporary construction and support facilities required include but are not limited to:

1. Sanitary facilities, including drinking water.
2. Temporary enclosures.
3. Waste disposal services.
4. Construction aids and miscellaneous services and facilities.

C. Security and protection facilities required include but are not limited to:

1. Temporary fire protection.
2. Barricades, warning signs, lights.
3. Enclosure fence for the site necessary for a safe and secure site.
4. Environmental protection.

1.3 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

1.4 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

1. Building Code requirements.

2. Health and safety regulations.

3. Utility company regulations.

4. Police, Fire Department and Rescue Squad rules.

5. Environmental protection regulations.

B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library, "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

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

1.5 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Water: Provide potable water approved by local health authorities.

C. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1-1/2" I.D. for line posts and 2-1/2" I.D. for corner posts.

2.2 EQUIPMENT

A. General: Provide new equipment; if acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

C. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

D. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

E. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

F. First Aid Supplies: Comply with governing regulations.

G. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

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

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.

4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a Change Order.

3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.

B. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best service the Project's needs.

1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

C. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

E. Enclosure Fence: When construction activities warrant install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except by the entrance gates.

1. Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.

F. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.

2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Architect requires that it be maintained longer, remove each temporary facility when the need has ended, or when 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 the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of the Contractor.

2. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

   a. Replace air filters and clean inside of ductwork and housings.

   b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.

   c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01-5000

SECTION 01-6000 - PRODUCT HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURERS' RECOMMENDATIONS

A. Determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.4 PACKAGING

A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.

1. Maintain packaged materials with seals unbroken and labels intact until time of use.

2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

B. The Architect may reject as noncomplying such material and products that do not bear identification as to manufacturer, grade, quality, and other pertinent information.

1.5 PROTECTION

A. Protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.

B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

D. All finish material shall be properly covered for weather protection.

1.6 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs required to provide the proper item and quality specified and at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01-6100 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

1.3 DEFINITIONS

A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:

1. Revisions to the Contract Documents requested by the School District.

2. Specified options of products and construction methods included in the Contract Documents.

3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

A. Substitution Request Submittal: The Architect will consider requests for substitution if received within 35 days after award of the Contract. Requests received more than 35 days after award of the Contract may be considered or rejected at the discretion of the Architect.

1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.

2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.

3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

   a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the City and separate contractors, that will be necessary to accommodate the proposed substitution.

   b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.

   c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures of the specified product and the proposed substitution.

   d. Samples of both the specified product and the proposed substitution where applicable or requested.

   e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

   f. Cost information, including a proposal of the net deduct, if any in the Contract Sum.

   g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.

   h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

4. Architect's Action: If necessary, the Architect will request additional information or documentation for evaluation within 10 days of receipt of a request for substitution. The Architect will notify the Contractor of acceptance or rejection of the substitution within 21 days of receipt of the request, or 10 days of receipt of additional information or documentation, whichever is later. Acceptance will be in the form of a change order.

a. Use the product specified if the Architect cannot make a decision on the use of a proposed substitute within the time allocated.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.

1. Extensive revisions to the Contract Documents are not required.

2. Proposed changes are in keeping with the general intent of the Contract Documents.

3. The request is timely, fully documented, and properly submitted.

4. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

5. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.

6. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume.

7. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.

9. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.

10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

C. The Contractor requesting the substitution will be responsible for compensating the Architect for any redesign and evaluation services at the Architect’s standard billing rate, be responsible for any increased cost of related construction , and similar considerations.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01-6100

MANDATORY SUBSTITUTION REQUEST FORM

To: Alameida Architecture, 555 South Main Street, Sebastopol CA 95472

Email: donald@alameida.com

PROJECT NAME:

CITY OF HEALDSBURG
2015-16 MEASURE V - MULTI-SITE IMPROVEMENT PROJECT

We hereby submit for your consideration the following product in substitution for the product specified in the Documents:

Section/Paragraph Item

_____

MANDATORY INFORMATION ATTACHMENTS

- ☐ Attach complete information or changes to Drawings and/or Specifications which proposed substitution will require for its proper installation including dimensions.
- ☐ Attach currently dated Manufacturer's literature. Highlight items selected for this review. (NOTE: This preprinted information **MUST SHOW ALL** aspects of equality that of the item(s) specified.)
- ☐ Attach letter(s) from Manufacturer's Representative indicating compliance or variance from specification qualities if available and/or applicable.

A. Describe the principle differences between the proposed product and that specified:

B.Names of this and other subcontractors affected by this substitution:

C.Describe any differences in the manufacturer's certified guarantees/ warranties of the proposed and specified items:

D.Describe time-table for delivery of item substituted if relevant:

E.Will maintenance and service parts be locally available?

F.

G.What is the cost difference between the specified item and the substituted item?

Specified Item: $ _____

Substituted Item: $ _____

Cost Difference: $ _____

Signature: _____ Name: _____ Address: _____ Date: _____ Telephone: _____ Name of Manufacturer's Representative: _____ Telephone: _____	FOR USE BY ARCHITECT Accepted Accepted as Noted Received Too Late By: _____ Remark: _____

SECTION 01-6110 - CALGREEN SUSTAINABILITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures for compliance with California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

1. Chapter 5-Non-Residential Mandatory Measures.

1.2 RELATED REQUIREMENTS

A. Section 01-7419 - Construction Waste Management and Disposal.

B. Section 01-6116 - Volatile Organic Compound (VOC) Restrictions.

C. Section 01-9113 - General Commissioning.

D. Section 01-700 - Contract Closeout.

E. Section 31-0165 - Construction Site Best Management Practices Plan.

F. Section 32-8400 - Irrigation.

1.3 DEFINITIONS

A. CAL-Green Definitions: Certain terms are defined by CAL-Green in Chapter 5 of the Code. Words and terms used in this section shall have the meanings shown therein.

1.4 INFORMATIONAL SUBMITTALS

A. General: Submit CAL-GREEN submittals required by code and in other Specification Sections.

B. CAL-GREEN submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated CAL-GREEN requirements.

C. Acceptable verification submittals are specified in the related sections.

PART 2 - PRODUCTS

2.1 REQUIREMENTS - GENERAL

A. Provide products and procedures necessary to confirm CAL-GREEN compliance required in this Section. Although other Sections may specify some CAL-GREEN requirements, the Contractor shall determine additional materials, techniques, means, methods and procedures necessary to comply with CAL-GREEN requirements.

2.2 STORM WATER POLLUTION PREVENTION PLAN

A. Section 5.106.1: Comply with requirements of this code section, local ordinances, General Conditions, Special Provisions, and related sections specifying erosion control.

2.3 OUTDOOR WATER USE

A. Section 5.304.3.1: Irrigation Controllers: Comply with requirements of this code section, local ordinances and pertinent irrigation sections.

2.4 CONSTRUCTION WASTE REDUCTION

A. Section 5.408 Construction Waste Management, Diversion and Recycling: Comply with requirements of this code section, local ordinances and Section 01801.

2.5 BUILDING MAINTENANCE AND OPERATION

A. Section 5410.2.3, 4. Commissioning and Functional Performance Testing: Participate in Commissioning and provide functional performance testing as required by these code sections and as specified in Section 01660 and Section 01810.

B. Section 5.410.2.5. Documentation and Training: Provide Operations Training as required by these code sections and as specified in Section 01660 and Systems Manual as specified in Section 01810.

2.6 POLLUTANT CONTROL

A. Section 5504.3 Indoor Air Quality: Comply with requirements of this code section, local ordinances.

1. During storage, rough installation and until final start-up of HVAC equipment, securely cover all ducts and air distribution component openings with plastic tape, sheet metal or other methods acceptable to enforcing agency to reduce dust or debris collected in the system.

B. Section 5.504.4 Finish Material Pollutant Control: All Finish materials shall comply with requirements of this code section, local ordinances and Section 016116.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with Section 01801 -Construction Waste Management and Disposal.

B. Comply with execution requirements of related sections and applicable local codes and ordinances.

END OF SECTION

SECTION 01-6116 - VOLATILE ORGANIC COMPOUND (VOC) RESTRICTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. VOC restrictions for product categories listed below under 'DEFINITIONS."

1. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

B. All products of each category that are installed in the project must comply; applicable laws and ordinances do not allow for partial compliance.

C. Listing of a product in these specifications shall not be construed as a solicitation or requirement to use any product or combination of products in violation of the requirements of South Coast Air Quality Management District Rule No.1168, as described in Rule 1168(g).

1. If a listed product does not meet the requirements of this rule, request approval for use of an alternate product by the same or another manufacturer meeting the requirements of this rule.

2. Do not use products which do not meet the requirements of this rule.

1.2 RELATED REQUIREMENTS

A. Divisions 01 through 33 contain related requirements specific to the work of each of these Sections. Requirements may or may not include reference to this section.

B. Section 01600 "CalGreen Sustainability Requirements ".

1.3 DEFINITIONS

A. VOC-Restricted Products: All products of each of the following categories when installed or applied on-site:

1. Adhesives, sealants, and sealer coatings, regardless of specification section or division.

2. Paints and coatings.

3. Carpet and resilient flooring.

4. Composite wood products; plywood, particleboard, wood fiberboard.

B. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

C. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.4 REFERENCE STANDARDS

A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

B. Low-Emitting Materials Product List; California Collaborative for High Performance Schools (ClIPS); current edition at www.chps.net.

C. CR1 (GLCC) - Green Label Testing Program .. Approved Product Categories for Carpet Cushion; Carpet and Rug Institute; Current Edition.

D. CRT (GLP) - Green Label Plus Carpet Testing Program- Approved Products; Carpet and Rug Institute; Current Edition.

E. GET (SCH) - GREENGUARD 'Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.grcenguard.org.

F. GreenSeal GS-36 - Commercial Adhesives; Green Seal, Inc.

G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; wwwaqmd. gov.

H. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scscertified.com.

1.5 SUBMITTALS

A. See Section 013300 -Submittals Procedures.

B. Evidence of Compliance: Submit for each different product in each applicable category.

1. Identify evidence submittals with the words "CAL-Green VOC Compliance Report".

C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.

D. Installer shall to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agri-fiber products have been used in the installation of his products, or 2) that such products used comply with these requirements.

E. Provide to Enforcing agency further documentation as requested including

1. Additional Manufacture's documentation.

2. On site product containers

3. Chain of Custody Certification

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 - PRODUCTS (NOT APPLICABLE)

2.1 MATERIALS

A. General: Provide only products having volatile organic compound (VOC) content not greater than required by South Coast Air Quality Management District Rule No.1168 and less where required by code.

1. These products may be specified in multiple sections throughout these specifications.

B. Adhesives, including carpet: Comply with Title 24, Part 11, Table 5.504.4.1.

1. Evidence of Compliance: Acceptable types of evidence are:

a. Report of laboratory testing performed in accordance with requirements.

b. Published product data showing compliance with requirements.

c. Certification by manufacturer that product complies with requirements.

C. Joint Sealants: Comply with Title 24, Part 11, Table 5.504.4.2.

1. Evidence of Compliance: Acceptable types of evidence are:

a. Report of laboratory testing performed in accordance with requirements.

b. Published product data showing compliance with requirements

c. Certification by manufacturer that product complies with requirements.

D. Aerosol Adhesives: Comply with Title 24, Part 11, Table 5.504.4.1. and California Code of Regulations Title 17, Section 94507.

1. Evidence of Compliance: Acceptable types of evidence are:

a. Current GreenSeal Certification.

b. Report of laboratory testing performed in accordance with GreenSeal CS-36 requirements.

c. Published product data showing compliance with requirements.

E. Paints and Coatings: Comply with Title 24, Part 11, Table 5.504.4.3; California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008.

1. Determination of VOC Content: Testing and calculation in accordance with 40 CER 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

a. Evidence of Compliance: Acceptable types of evidence are:

1) Report of laboratory testing performed in accordance with requirements.

2) Published product data showing compliance with requirements.

3) Certification by manufacturer that product complies with requirements.

b. Provide coatings that comply with the most stringent requirements specified in the following:

1) 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.

2) South Coast Air Quality Management District Rule No.1168.

F. Carpet: Comply with Title 24, Part 11, 5.504.4.4; meet testing and product requirements of one of the following:

1. Carpet & Rug Institute "Green Label Plus".

2. California Department of Public Health Standard Practice for testing of VOC's (Specification 01350).

3. NSF/ ANSI 140 at Gold Level.

4. Scientific Certification Systems Sustainable Choice

5. All carpet cushion installed shall meet requirements of Carpet & Rug Institute "Green Label Program".

6. All carpet cushion installed shall meet requirements of Title 24, Part 11, Table 5.504.4.1.

G. Resilient Flooring Products: Comply with Title 24, Part 11, 5.504.4.6. Fifty percent of floor area receiving resilient flooring shall have flooring complying with VOC emission limits in CHPS 2009 criteria and listed on the Low Emitting Materials List or Product Registry or certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.

1. Provide documentation verifying that finish materials are certified to meet pollutant limits. Acceptable types of evidence are:

a. Published product data showing compliance with requirements.

b. Inclusion on one of the following lists:

1) www.chps.net/dev/drupal/node/381

2) www.rfci.com/int F&ProdCerthtm

3) wwwgreenguard.org/defaulLaspx?tabid=135

4) Other method acceptable to enforcing agency.

H. Composite Wood Products: Comply with Title 24, Part 11, Table 5.504.4.5 formaldehyde limits for hardwood plywood, particleboard, and medium density fiberboard composite wood products.

1. Title 24, Part 11, Table 5.504.4.5 Composite Wood Products Maximum Formaldehyde Emissions in Parts per Million.

PRODUCT	CURRENT LIMIT (Effective July 1, 2022)
Hardwood Plywood veneer core	0.05
Hardwood Plywood composite core	0.05
Particleboard	0.09
Medium Density Fiberboard	0.11
Thin Medium Density Fiberboard	0.13

2. Evidence of Compliance: Acceptable types of evidence are;

   a. Chain of custody certifications

   b. Published product data showing compliance with requirements.

   c. Certification by manufacturer that product complies with requirements.

   d. Other method acceptable to enforcing agency.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. All additional costs to restore indoor air quality, including fines by authorities, due to installation of non-compliant products will be borne by Contractor.

3.2 RESTRICTED COMPONENTS

A. Restricted Components:

1. Paints and coatings shall not contain any of the following;

a. Acrolein.
b. Acrylonifrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.

h. Diethyl phthalate.
i. Dimethyl phthalate.
k. Formaldehyde.
l. 1-lexavalent chromium.
m. Isophorone.
n. Lead.
o. Mercury.
p. Methyl ethyl ketone.
q. Methyl isobutyl ketone.
r. Methylene chloride.
s. Naphthalene.
t. Toluene (methylbenzene).
u. 1,1,1-trichloroethane
v. Vinyl chloride.

j. Ethylbenzene.

2. Table 5.504.4.1 ADHESIVE VOC LIMIT

Architectural Applications -	Current VOC Limit
Indoor Carpet Adhesives	50
Carpet Pad Adhesives	50
Outdoor Carpet Adhesives	150
Wood Flooring Adhesives	100
Rubber Floor Adhesives	60
Subfloor Adhesives	50
Ceramic Tile Adhesives	65
VCT and Asphalt Tile Adhesives	50
Dry Wall and Panel Adhesives	50
Cove Base Adhesives	50
Multipurpose Construction Adhesives	70
Structural Glazing Adhesives	100
Single Ply Roof Membrane Adhesives	250
Specialty Applications -	Current VOC Limit
PVC welding	510
CPVC welding	490
Abs welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact Adfhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
Substrate Specific Applications	
Metal to metal	30
Plastic Foams	50
Porous materials (except wood)	50
Wood	30
Fiberglass	80

3. TABLE 5.5o4.4.2 SEALANT VOC Limit
Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS j	CURRENT VOC LIMIT
Architectural	250
Marine deck	760
Non-membrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420

SEALANT PRIMERS	
Architectural Nonporous Porous	250 775
Modified bituminous	500
Marine deck	760
Other	750

Note: For additional information regarding methods to measure the VOC content specified in these tables, see South Coast Air Quality Management District Rule 1168.

4. TABLE 5.504.4.3 VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS

Grams of VOC Per Liter of Coating, Less Water and Less Exempt Compounds

COATING CATEGORY	CURRENT LIMIT
Flat coatings	50
Nonflat coatings	100
Nonflat high gloss coatings	150
Specialty Coatings	
Aluminum roof coatings	400
Basement specialty coatings	400
Bituminous roof coatings	50
Bituminous roof primers	350
Bond breakers	330
Concrete curing compounds	350
Concrete/masonry sealers	100
Driveway sealers	50
Dry fog coatings	150
Faux finishing coatings	350
Fire resistive coatings	350
Floor coatings	100
Form-release compounds	250
Graphic arts coatings (sign paints)	500
High-temperature coatings	420
Industrial maintenance coatings	250-
Low solids coatings[1]	120
Magnesite cement coatings	450
Mastic texture coating	100
Metallic pigmented coatings	500
Multicolor coatings	250
Pretreatment wash primers	420
Primers, sealers and undecoaters	100
Reactive penetrating sealers	350

Recycled coatings	250
Roof coatings	50
Rust preventative coatings	250
Shellacs: Clear Opaque	 730 550
Specialty primers, sealers and undercoaters	100
Stains	250
Stone consolidants	450
Swimming pool coatings	340
Traffic marking coatings	100
Tub and tile refinish coating;	420
Waterproofing membranes	250
Wood coatings	
Wood preservatives	350
Zinc-rich primers	

Grams of VOC per liter if coating, including water and including exempt compounds. The specified Emits remain in effect unless revised limns are listed in subsequent columns in the table.
Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available from the Air Resources Board.

5. TABLE5O4.4.5 FORMALDEHYDE LIMITS[1]
Maximum Formaldehyde Emissions in Parts per Million.

PRODUCT	CURRENT LIMIT
Hardwood plywood veneer core	0.05
Hardwood plywood composite core	0.05
Particle board	0.09
Medium density fiberboard	0.11
Thin medium density fiberboard	0.13

1. Values in this table are derived frc'ir those specified by the Califoria Air Resources Board, Air Toxics Conntrol Measure for Composite Wood as tested in accordance with ASTM E 1333. For additional information, see California code of Regulations, Title17, Sections 93120 through 93.10.12.
2. Thin medium density fiberboard has a maximum thickness of 5/16" (8 mm).

PART 4 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01502

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.
2. Project record document submittal.
3. Operating and maintenance manual submittal.
4. Submittal of warranties.
5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through - 32.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
2. Advise Owner of pending insurance change-over requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

6. Deliver tools, spare parts, extra stock, and similar items.

B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or

5. Submit consent of surety to final payment.

6. Submit a final liquidated damages settlement statement.

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.

1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advice the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

1.5 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.

B. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

C. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in the actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation

instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Architect for the Owner's records.

D. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Architect for the Owner's records.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01-7000

SECTION 01-7419 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Contractor shall implement procedures to divert 75% of construction waste. As many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.

B. The Contractor shall develop a Waste Management Plan as defined in this Section and submit for review by the Owner and Architect.

1.3 DEFINITIONS

A. Waste Materials: construction materials that are excess to the contract requirements and which cannot be effectively used in the Work.

B. Salvage Materials: waste materials or materials that exist on the site that can be reused, either on site or by another entity.

C. Recyclable Waste: waste materials that exist on site or are generated during the construction process that can be recycled/remanufactured into another material.

D. Categories of salvageable or recyclable waste include the following:

1. Concrete, Masonry, and Other Inert Fill Material: concrete, brick, rock, broken up asphalt pavement, day, and other inert (non-organic) materials.

2. Metals: metal scrap including iron, steel, copper, brass, and aluminum; includes beverage containers, packaging materials (such as metal banding), fencing, reinforcing bar, wiring, plumbing, etc.

3. Untreated Wood: unpainted, untreated dimensional lumber, wood edging, wood shipping pallets, etc. Does not include pressure treated or creosote treated wood.

4. Engineered Wood Products: plywood, oriented strand board, "Masonite", particleboard, manufactured trusses and beams, and glue-laminated timbers.

5. Gypsum Wallboard: excess drywall construction materials including cuttings, other scrap, and excess materials.

6. Cardboard: clean, corrugated cardboard such as used for packaging, etc.

7. Paper Goods:

   a. Office paper: includes any paper, such as manufacturer instruction, specification sheets, files, correspondence, packaging, stiffeners, etc.

   b. Newsprint shredded or whole newspaper goods.

8. Plastic: beverage containers, packaging materials (such as polystyrene "peanuts" and expanded polystyrene), containers (other than those used for hazardous materials), vinyl products, etc.

9. Class: includes glass beverage containers, and recyclable glass building materials.

10. Insulation: rigid foam, halt, and loose fill insulation materials.

11. Carpet: face fiber, backing, padding, and carpet cushion scrap.

12. Paints: unused portions of paints and coatings applied on-site.

13. Fabric: uncontaminated fabric scraps.

14. Rubber: uncontaminated rubber scraps, including but not limited to recycled-content rubber flooring, rubber edging, tires that are no longer serviceable, etc.

15. Other: any additional materials identified on-site to be valued for salvage, reuse, or recycling by the Contractor, Owner, or Architect

E. Non-Recyclable Waste: All waste materials that are notable to be recycled, due to contamination, lack of recycling facilities or salvage options, or high cost

F. Source Separated: Materials that are separated on-site by category

G. Co-Mingled: Several types of construction waste that are combined in a single container. Co-mingling of recycling waste must be approved by the identified recycling facility.

H. Hazardous Waste: Any substance whose handling and/or disposal is regulated as hazardous waste by local, state, or federal authorities.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with all applicable federal, state, and local ordinance and regulation requirements for recycling and waste management.

B. Disposal Sites, Recyclers. and Waste Materials Processors: Use only facilities properly permitted by state and local authorities.

C. Preconstruction Waste Management Conference: Prior to beginning work at the site, schedule and conduct a conference to review the Construction Waste Management Plan and discuss procedures, schedules and specific requirements for waste materials recycling and disposal. Discuss coordination and interface between the Contractor and other construction activities. Identify and resolve problems with compliance with requirements. Record minutes of the meeting, identifying all conclusions reached and matters requiring further resolution. 1. Plan Revision: Make any revisions to the Construction Waste Management Plan agreed upon during the meeting and incorporate resolutions agreed to be made subsequent to the meeting. Submit the revised plan to the Contracting Officer's Representative for approval.

D. Implementation:

1. Designate an on-site party responsible for instructing workers and implementing the Construction Waste Management Plan.

2. Distribute copies of the Construction Waste Management Plan to the job site foreman and each subcontractor.

3. Include waste management and recycling in worker orientation.

4. Provide on-site instruction on appropriate separation, handling, recycling, and salvaging methods to be used by all parties at the appropriate stages of the work at the site.

5. Prominently display Waste Management Plan and clearly mark all containers and areas on site dedicated to source separation.

6. Include waste management and recycling discussion in pre-fabrication meetings with subcontractors and fabricators.

7. Also include discussion of waste management and recycling in regular job meetings and job safety meetings conducted during the course of work at the site.

1.5 STORAGE AND HANDLING

A. Salvage Materials: Provide protective handling and storage as required for all items identified for salvage and reuse by the Owner or Architect.

B. Recyclable Waste: Remove all recyclable materials, as identified in the Waste Management Plan, from the work location to approved containers daily. Failure to remove waste materials will be considered cause for withholding payment and/or termination of Contract.

C. Provide separate collection containers as required by recycling haulers and to prevent contamination of materials, including protection from rain as applicable.

D. Replace loaded containers with empty ones as demand requires but not less than weekly.

E. Handling: Deposit all indicated recyclable materials in the containers in a clean (no mud, adhesives, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.

F. If contamination chemically combines with the material so that it cannot be cleaned, do not deposit into the recycle containers.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Transport recyclable waste materials from the Work Area to the recycle containers and carefully deposit in the containers in a manner to minimize noise and dust Close container covers immediately after materials are deposited. Do not place recyclable waste materials on the ground adjacent to a container.

B. Existing Conditions: Coordinate with "Instructions to Bidders" and "Supplementary Conditions'.

1.7 SUBMITTALS

A. Construction Waste Management Plan: Contractor must submit complete Construction Waste Management Plan for review within 30 days from the Notice to Proceed.

PART 2 - PRODUCTS

A. Construction Waste Management Plan: Contractor shall develop a construction waste management plan indicating proposed methods for collection, segregation, and removal of all construction wastes and debris produced by the work of this Contract, including all costs associated with this plan. Those waste materials produced during the course of this Contract that can be recycled cost-effectively, shall be. The Waste Management Plan shall include, at a minimum, the following:

1. Provide an analysis of jobsite waste to be generated, including types and quantities.

2. Provide strategies for salvage, reuse, or recycling for a minimum of all materials listed below. Include additional waste materials that are deemed cost-effective to salvage, reuse, or recycle. See "Definitions" above for material categories.

3. Provide documentation to justify decision not to recycle any items listed below.

4. Show compliance with applicable state and local ordinances and regulations.

5. Include a list of recycling facilities to which indicated recyclable materials will be distributed for disposal.

6. Identify materials that are not recyclable or otherwise conservable that must be disposed of in a landfill or other means acceptable under governing State and local regulations.

7. List permitted landfills and/or other disposal means to be employed.

8. Indicate any instances where compliance with requirements of this Section does not appear to be possible and request resolution from the Architect.

B. Waste Materials: The following materials shall be salvaged or recycled according to this specification. Strategies for salvage and recycling shall be identified in the Waste Management Plan as required above.

1. Salvage Materials: Identify materials existing on site that are candidates for salvage and reuse, either on this Project or through sale or donation to local organizations.

2. Recyclable Materials: The following materials, at a minimum, shall be salvaged or recycled. Applies to all such listed waste materials produced during the course of this Contract.

   a. Concrete, Masonry, and Other Inert Fill Material

   b. Metals

   c. Untreated Wood

   d. Gypsum Wallboard Scrap

   e. Cardboard

   f. Paper Goods

   g. Beverage Containers

   h. Plastic

   i. Glass

   j. Carpet

C. Delivery Receipts: Maintain copies of delivery receipts for waste materials salvaged and sent to permitted waste materials processors or recyclers that indicate the location and name of firm accepting recyclable waste materials, types of materials, net weights of each type, date of delivery and value of materials.

D. Maintain working copy of Construction Waste Management Plan at site for review by Owner, Architect, and all Trades involved in Project.

PART 3 - EXECUTION

3.1 WASTE MANAGEMENT

A. General: Implement waste management procedures in accordance with approved construction waste management plan. Maintain procedure throughout the life of this Contract.

B. Source Separation: Separate, store, protect, and handle at the project site all identified recyclable and salvageable waste products to prevent contamination of materials and maximize recyclability and salvageability of materials.

C. Collection: Arrange for timely pickups from the site or deliveries to approved recycling facilities of designated waste materials to keep construction site

clear and prevent contamination of recyclable materials. Maintain records accessible to the Contracting Officers Representative for verification of construction waste materials recycling.

D. Delivery Receipts: Keep and maintain records of all deliveries to recycling facilities and all pickups of waste materials at the site by others as specified above.

E. Salvage and Reuse: Identify salvage and reuse options for all materials that are deemed to be reusable, but will not be reused on this Project.

F. Non-Recyclable Was: Collect and segregate non-recyclable waste for delivery to a permitted landfill site.

G. Hazardous Waste: Control and dispose of hazardous waste in accordance with local, state, and federal regulations.

END OF SECTION 01501

SECTION 02-4119 - DEMOLITION, CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide Demolition, Cutting, and Patching as specified and shown on Drawings.

1.2 DEFINITIONS

A. Demolition: Includes disconnecting and removing from the premises items shown on plans to be removed, or items which are not required in the finished installation.

B. Cutting: Includes cutting into existing construction to permit completion of contract work.

C. Patching: Includes restoration of surfaces disturbed by demolition, cutting, or other contract operations.

1.3 QUALITY ASSURANCE

A. Employ skilled workmen with experience in type of work required.

B. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or load-deflections ratio.

C. Before cutting and patching the following categories of work, obtain architect's approval to proceed.

1. Structural steel.
2. Structural concrete.
3. Piping, ductwork, vessels and equipment.
4. Electrical systems.

D. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life of decreased safety.

E. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in occupied spaces, in a manner that would, in the architect's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by the architect to be cut and patched in a visually unsatisfactory manner.

1.4 DELIVERY, STORAGE AND HANDLING

A. Carefully remove, store, and protect materials designated to be re-used in contract work.

B. Materials designated for demolition shall become Contractor's property and removed from the Site.

C. Materials designated to be salvaged for the Owner shall be removed with care, protected, and stored in a location specified by the Owner.

D. Comply with minimum requirements in Section 01600.

1.5 SCHEDULING

A. Schedule Demolition, Cutting, and Patching to precede construction and be completed without delay.

B. Schedule work in ceiling spaces above occupied rooms in advance of other work and on overtime.

C. Do not permit demolition work or noisy activities during scheduled time for removal of debris.

D. Comply with requirements in Section 01300.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use materials for patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for patching that will result in equal or better performance characteristics.

B. Plaster (where applicable) Comply with requirements of Section 09200, or comply with requirements in Part - 3 of this Section.

C. Concrete: Contractor designed mixes to produce following:

1. Concrete, Typical: Compressive strength of 3000 pounds per square inch at 28 days.

D. Bonding Agent: "Weldcrete" of Larson Products, "Hornweld" of A.C. Horn, "Sonocrete" of Sonneborn-Contech, or equal.

E. Grout for patching holes in existing concrete surfaces: Nonshrink type, factory pre-mixed grout, "Vibrofoil" of A.C. Horn, "Ferrolith" of Sonneborn Contech, or equal.

F. Patching of Holes in Fire-Rated Surfaces: Comply with requirements of Section 07270.

G. Weather Exposed Or Moisture Resistant Surfaces Or Elements:

1. Where specifications are not included for items requiring patching comply with requirements of Article titled “Materials”, sub-Article titled “General” in this Section and manufacturer’s specifications and standards for each product involved.

2. Such products are as follows:

a. EPDM single-ply membrane roofing.

b. APP – Modified Bituminous sheet roofing

c. Cement Plaster.

PART 3 - EXECUTION

3.1 INSPECTION

A. Before beginning demolition work, examine site and verify the following:

1. Existing utility lines to be removed have been disconnected.

2. Utility lines serving occupied portions of building will remain in operation during demolition.

3. Dust barriers are in place, and conditions specified in Sections 01010, 01011, and 01012 are met.

B. Before Cutting Operations: Examine surfaces to be cut and patched and conditions under which work is to be performed. If unsafe, or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

C. If any hazardous material are encountered, notify Architect immediately and obtain instructions for safe handling and removal. See Division 0 – Hazardous Material Emergency Response Act.

3.2 PREPARATION

A. Temporary Support: To prevent structural failures, provide temporary support of work to be cut.

B. Protection:

1. Protect adjacent work from damage during demolition, cutting and patching.

2. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take precautions not to cut existing pipe, conduit, or ducts serving the building but scheduled to be relocated until provisions have been made to bypass them.

E. Rooms adjacent to contract work may be occupied during the construction period. Maintain a tight barrier at openings into those rooms and remove debris in covered containers.

3.3 CUTTING

A. General:

1. Use methods least likely to damage existing construction to remain and materials to be re-established.

2. Ensure by-pass of utility services, such as pipe and conduit, has been completed before cutting, where such utility services are shown or required to be removed, relocated, or abandoned.

3. After cutting, cap, valve, or plug and seal tight remaining portions of pipe and conduit to prevent entrance of moisture or other foreign matter.

3.4 PATCHING

A. General:

1. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work. Where feasible, inspect and test patched areas to demonstrate integrity of the work.

2. Restore exposed finishes of patched areas. Where necessary, extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

3. Where patch occurs in a smooth painted surface, and after patched area has received prime and base coat, extend final paint coat over entire un-broken surface containing the patch.

4. Patch, repair, or re-hang existing ceilings as necessary to provide an even plane of surface of uniform appearance. Where partitions or portions of existing ceilings have been removed, reinforce edges of remaining ceiling.

5. Where existing plaster surfaces have been removed and remaining edges are to mate with gypsum board, carefully cut board to closely approximate the plaster profile. Carefully shim, furr, or otherwise provide backing for gypsum board in order to bring it to the face of existing plaster. Remove paint from existing plaster edges, apply tape and joint compound and feather out to existing plaster surfaces.

B. Plaster Installation:

1. Unless otherwise indicated, provide 3-coat work in accordance with the California Lathing and Plastering Contractors Association, Inc. (CLPC) recommendations.

2. Finish plaster with surface to closely match adjacent surface.

3. Cut, patch, point-up, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections.

4. Comply with specifications in Section 09200.

C. Hangers and Supports:

1. Provide new hangers and supports for existing piping, conduit, or ductwork to remain after removal of existing partitions or ceilings. Conform to support details specified or shown for new work. Refer to specifications in Divisions 15 and 16.

D. Holes in Existing Concrete Floor Slabs, with a diameter not over the depth of the slab: Ream to a conical shape not less than 0.25:1 with the smallest

diameter at the bottom of the slab. Roughen surfaces and clean away dust and loose particles. Fill with grout specified in this Section for patching holes in existing concrete surfaces. For patching larger openings, notify the Architect for this project.

3.5 PATCHING EXISTING DAMAGE

A. Floor Openings Around Pipe, Duct, and Conduit Penetrations:

1. Remove non-rated or loose filler material and fill with approved 2-hour fire resistive packing.

2. Comply with specifications in Section 07270 and Divisions 15 and 16.

B. Piping: Restore damaged pipe covering to its original condition.

3.6 LEVELING EXISTING CONCRETE FLOOR SLABS

A. Patch depressions and level existing concrete floor slab to a surface plane tolerance of maximum 1/8-inch in 10-feet. Test with a 10-foot long straight edge.

B. Apply underlayment over entire work area in strict accordance with manufacturer's written instructions, before any partition framing is placed.

C. Keep traffic off the floor during curing period in accordance with manufacturer's printed recommendations, but in any case not less than 4-days.

3.7 ELECTRICAL DEMOLITION

A. Do not shut down electrical service without approval of owner's Representative.

B. Do not begin demolition until all conduits have been traced by Contractor and services have been disconnected, as specified in Division 16.

C. Provide additional wiring and work as required to maintain service to adjacent spaces during demolition, as specified in Division 16.

D. Remove electrical service in demolition area including items in existing walls and ceilings to remain.

E. Demolition of electrical Services:

1. Remove device and wiring to panel without disturbing existing service to remain.

2. Remove empty conduit back to boundary of Project area.

F. Relocate or re-hang existing conduit when existing supports have been demolished or where there is interference with new light fixtures, in accordance with specifications in Division 16.

G. Electrical demolition work shall be performed by certified journeyman electrician.

3.8 CLEANING

A. Thoroughly clean spaces where work has been performed or used for access to work.

B. Completely remove paint, mortar, oils, putty, and materials of similar nature.

C. Thoroughly clean piping, conduit, and similar items, before painting or other finishing is applied.

D. Remove debris daily. Remove debris which must be transported through public corridors during non-occupied hours.

E. Debris Containers:

1. Transport removal of debris in tightly sealed, covered, rubber tired containers.

2. Fit containers with clean polyethylene covers completely sealed at perimeters by taping or tying with wire.

3. Wipe containers clean before leaving construction area to prevent tracking of dust.

F. Place covers over debris boxes between periods when they are being filled.

END OF SECTION

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 SUMMARY

A. This section includes the following metal fabrications:

1. Rough hardware.
2. Loose bearing and leveling plates.
3. Loose steel lintels.
4. Miscellaneous framing and supports for the following:
    a. Applications where framing and supports are not specified in other sections.
5. Miscellaneous steel trim.
6. Shelf and relieving angles.
7. Metal bar gratings.
8. Steel pipe railings.
9. Pipe bollards.

1.3 DEFINITIONS

A. Definitions in ASTM E 985 for railing-related terms apply to this section.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.

1. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

    a. Concentrated load of 300 lbf applied at any point nonconcurrently, vertically downward, or horizontally.

    b. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

    a. Concentrated load of 200 lbf applied at any point nonconcurrently, vertically downward or horizontally.

    b. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 lbf applied to one sq. ft. at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for products used in miscellaneous metal fabrications, including paint products and grout.

C. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

D. Samples representative of materials and finished products as may be requested by Architect.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.

F. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project name, addresses, names of Architects and Owners, and other information specified.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Firms experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Installer Qualifications: Arrange for installation of metal fabrications specified in this section by same firm that fabricated them.

C. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel", and D1.2 "Structural Welding Code - Aluminum."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.7 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.8 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of wall handrails as follows:

1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

2. Mount handrails only on gypsum board assemblies reinforced to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of Installer.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade

names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A 36.

C. Steel Bars for Gratings: ASTM A 569 or ASTM A 36.

D. Steel Tubing: Product type (manufacturing method) and as follows:

1. Hot-Formed Steel Tubing: ASTM A 501.

a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

E. Uncoated Structural Steel Sheet: Product type (manufacturing method), quality, and grade, as follows:

1. Cold-Rolled Structural Steel Sheet: ASTM A 611, grade as follows:

a. Grade A, unless otherwise indicated or required by design loading.

F. Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:

1. Cold-Rolled Steel Sheet: ASTM A 366.

G. Galvanized Steel Sheet: Quality as follows:

1. Structural Quality: ASTM A 446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.

H. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

1. Galvanized finish.

2. Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

3. Pipe to be used for handrails is required to be 1½" O.D.

I. Gray Iron Castings: ASTM A 48, Class 10.

J. Malleable Iron Castings: ASTM A 47, grade 32510.

K. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

L. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

M. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

2.2 STAINLESS STEEL

A. Bar Stock: ASTM A 276, Type 304.

B. Plate: ASTM A 167, Type 304.

2.3 GROUT AND ANCHORING CEMENT

A. Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

B. Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include but are not limited to the following:

1. Nonshrink Nonmetallic Grouts:

a. "Bonsal Construction Grout"; W.R. Bonsal Co.

b. "Diamond-Crete Grout"; Concrete Service Materials Co.

c. "Sonogrout"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.or Approved Equal

2. Erosion-Resistant Anchoring Cement:

a. "Super Por-Rok"; Minwax Construction Products Division.

2.4 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

C. Lag Bolts: Square head type, FS FF-B-561.

D. Machine Screws: Cadmium plated steel, FS FF-S-92.

E. Wood Screws: Flat head carbon steel, FS FF-S-111.

F. Plain Washers: Round, carbon steel, FS FF-W-92.

G. Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.

H. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.

B. Lock Washers: Helical spring type carbon steel, FS FF-W-84.

2.5 PAINT

A. Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

B. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

2.6 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 deg F (55.5 deg C).

D. Shear and punch metals cleanly and accurately. Remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. Weld corners and seams continuously to comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain

structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

K. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.7 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.9 LOOSE STEEL LINTELS

A. Provide loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in concrete walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Galvanize loose steel lintels, unless otherwise noted.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using

mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

    a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide x 1/4 inch x 8 inches long.

C. Galvanize miscellaneous framing and supports in the following locations:

1. Exterior locations.

D. Stainless steel miscellaneous framing and supports in the following locations:

1. Exposed supports within lavatories

2.11 MISCELLANEOUS STEEL TRIM

A. Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

B. Galvanize miscellaneous framing and supports in the following locations:

1. Exterior locations.

2. Interior locations where indicated.

2.12 STEEL PIPE RAILINGS AND HANDRAILS

A. General: Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads. All Handrail pipes to be fabricated from 1-1/2” O.D. pipe.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.

C. Form changes in direction of railing members as follows:

1. By radius bends of radius tightest radius without crimping or deforming pipe.

D. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

F. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.

G. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4 inches high x 1/8 inch steel plate welded to, and centered between, each railing post.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

1. For railing posts set in concrete fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

2. For removable railing posts, fabricate slip-fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgement.

I. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

J. For exterior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

K. For interior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

2.13 PIPE BOLLARDS

A. Fabricate pipe bollards from Schedule 80 steel pipe. Cap bollards with 1/4 inch minimum thickness steel base plate.

B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4 inch thick steel plate welded to bottom of sleeve.

2.14 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Finish metal fabrications after assembly.

2.15 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning."

2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications that will be concealed in other construction, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application

D. Apply TNEMEC primer or approved equal to uncoated surfaces of metal fabrications that will be exposed in exterior or interior locations, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of Special Coatings manufacturer.

1. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

2.16 ALUMINUM FINISHES

A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

B. As Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.

C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces

level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

3.3 SETTING LOOSE PLATES

A. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

1. Use metallic nonshrink grout in concealed locations where not exposed to moisture; use nonmetallic nonshrink grout in exposed locations, unless otherwise indicated.

2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLATION OF SUPPORTS FOR TOILET PARTITIONS

A. Anchor supports securely to, and rigidly brace from, overhead building structure.

3.5 INSTALLATION OF STEEL PIPE RAILINGS AND HANDRAILS

A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction by one of the following:

1. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

2. Anchor posts in concrete by core drilling holes not less than 5 inches deep and 3/4 inch greater than outside diameter of post. Clean holes of all loose material, insert posts and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

a. Nonshrink, nonmetallic grout.

b. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch build-up, sloped away from post. For installations exposed on exterior, or to flow of water, seal anchoring material to comply with grout manufacturer's directions.

3. Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.

4. Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.

5. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.

6. Install removable railing/gate sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with exactly 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with pre-drilled hole for exposed bolt anchorage.

2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.

3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations for accurate location of backing members.

C. Expansion Joints: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of post.

3.6 INSTALLATION OF BOLLARDS

A. Anchor bollards in concrete by means of pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.

3.7 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements or Special Coating Manufacturer for touch-up of field painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05500

SECTION 06-1000 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes: Provision of all lumber framing, rough hardware and blocking as indicated in the contract drawings.

1.2 REFERENCES

A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.

B. Published Specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work in this Section where cited by abbreviations noted below (latest editions apply).

1. California Code of Regulations. Title 24, 2013 edition, also known as California Building Code (CBC), with amendments.

2. (APA) - American Plywood Association, "Guide to Plywood Grades".

3. (PS) - United States Product Standard, PS-1 "Construction and Industrial Plywood".

4. (UL) - Underwriters' Laboratories, Inc., "Fire Hazard Classification, FR-S".

5. (WCLIB) - West Coast Lumber Inspection Bureau, "Standard Grading Rules No. 16".

6. (WWPA) - Western Wood Products Association, "Grading Rules for Lumber".

7. (AWPA) - American Wood Preservers Association Standards.

8. (ASTM) - American Society of Testing and Materials.

1.3 SUBMITTALS

A. Shop Drawings of all specially fabricated rough hardware.

B. Certificates of compliance with standards specified.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Provide proper facilities for handling and storage of materials to prevent damage to edges, ends, and surfaces.

B. Keep materials dry. Where necessary, stack materials off ground on level flat forms, fully protected from weather.

1.5 JOB CONDITIONS

A. Environmental Requirements: Maintain uniform moisture content of lumber at not more than 19-percent before, during, and after installation.

B. Sequencing, Scheduling: Coordinate details with other Work supporting, adjoining or fastening to rough carpentry Work.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Rough Carpentry:

1. Sills on Concrete: Pressure treated Douglas Fir.

2. Lumber (Wood Framing): Meet requirements of Section 06-1600.

3. Plywood Sheathing: Meet requirements of Section 06-1600. Provide thickness shown on drawings.

B. Rough Hardware: All exterior hardware shall be hot-dipped galvanized.

1. Nails: Common wire, typical.

2. Powder Driven Fasteners: Tempered steel pins with special corrosion-resistant finish. Provide guide washers to accurately control penetration, maximum 3/4-inch. Accomplish fastening by low-velocity piston-driven powder-actuated tool. Pins and tool: Hilti Fastening Systems, Impex Tool Corporation, or equal product.

3. Expansion Bolts: Reverse cone, self-wedging, expansion type, Tightening of nut or increased tension on bolt shank shall act to force wedges outward to create positive increased resistance to withdrawal, Ramset/Read Head "Tru-Bolt", Hilti Kwik - Bolt TZ or better product.

4. Metal Timber Framing Connectors: Fabricate from hot-dipped galvanized steel. Connectors shall be at least 16-gauge material, 1/8-inch plate materials where welded, unless otherwise shown or specified, punched for nailing. Nails and nailing shall conform to the manufacturer's instructions, with a nail provided for each punched

hole. Manufactured by Simpson Strong-Tie Company or equal product.

5. Miscellaneous Hardware: Provide all common screws, bolts, fastenings, washers and nuts required to complete rough carpentry Work.

2.2 TREATMENTS

A. Fire-Retardant Treatment: Same as Koppers Co., Inc.'s "Non-Com" J.H. Baxter and Co.'s "Baco-Pyresote"; or equal product substituted.

B. Preservative Treatment: Furnish in accordance with AWPA.

2.3 FABRICATION

A. Preparation (Finish Carpentry):

1. Verify measurements at job site.

2. Verify details and dimensions of equipment and fixtures integral with finish carpentry for proper fit and accurate alignment.

3. Coordinate details with other work supporting, adjoining, or fastening to casework.

B. Lumber:

1. Air- or kiln-dry to maximum 19-percent moisture content prior to shipment. Stack and air-dry to maximum 15 percent in field prior to installation.

2. Furnish surfaced four sides, S4S, unless otherwise noted.

3. Size to conform with rules of governing standard. Sizes shown are nominal unless otherwise noted.

C. Wood Treatments:

1. Fire-Retardant Treatment:

a. Fire-retardant treat only wood blocking supporting truss joists on steel beams.

b. Treat in accordance with AWPA C20 and approved manufacturer's recommendations.

2. Preservative Treatment:

a. Treat lumber and plywood sheathing exposed to weather.

b. Lumber: Treat in accordance with AWPA C2.

c. Plywood: Treat in accordance with AWPA C9.

d. After treatment and prior to shipping, air- or kiln-dry lumber to maximum 19 percent moisture content. Air dry in field to maximum 15 percent prior to installation.

2.4 QUALITY CONTROL

A. Lumber shall bear grade-trademark or be accompanied by certificate of compliance of appropriate grading agency.

B. Plywood shall bear APA grade-trademark.

C. Air-dry all framing lumber to a maximum of 15 percent moisture content prior to installing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive rough carpentry Work and verify following:

1. Completion of installation of building components to receive rough carpentry Work.

2. That surfaces are satisfactory to receive Work.

3. That spacing, direction, and details of supports are correct to accommodate installation of blocking, backing, stripping, furring and nailers.

4. That all anchor bolts and holddown bolts are properly installed.

3.2 INSTALLATION

A. Cutting: Perform all cutting, boring, and similar Work required.

B. Studs, Joists, Beams, and Posts: Install all members true to line. No wood shingle shims are permitted. Place joists with crown up; maximum 1/4-inch crown permitted.

C. Nail joints in accordance with applicable requirements of the CBC unless otherwise shown or specified. Predrill where nails tend to split wood.

D. Bolt holes to be 1/16-inch oversize. Threads shall not bear on wood. Use standard malleable iron washers against wood. Carriage bolts require washers under the nut only.

E. Provide blocking, grounds, nailers, stripping, and backing as shown and as required to secure other Work.

F. Maintain 1/8-inch gap between all plywood panel edges.

G. Do not utilize plywood sheets having a width smaller than 2-feet 0-inches.

H. Plywood flooring shall be field glued with adhesives meeting APA specification AFG-01 applied in accordance with the manufacturers' recommendations. Apply continuous line of glue on joists and in groove of tongue and groove panels.

I. Where wood is cut, sawed, planed, bored or marred after preservative or fire-retardant treatment, apply two heavy brush coats of same material used in treatment.

J. Nail heads shall be driven flush with plywood surface. Overdriven nails (nails which fracture the outer ply layer) shall be replaced one for one.

K. Screws (Wood or Lag): Screws shall be screwed and not driven into place. Screw holes shall be predrilled to the same diameter and depth of shank. Holes for threaded portion shall be predrilled less than or equal to the diameter of the root of the thread. Provide standard cut washers under head of lag screws.

L. Sills under bearing, exterior and shear walls shall be bedded on 1/2-inch minimum drypack or grout to obtain continuous bearing.

3.3 CLEANING AND ADJUSTING (FINISH CARPENTRY)

A. Remove damaged or otherwise disfigured portions and replace with new prior to the Owner's acceptance.

B. Wash finished Work in strict accordance with product manufacturer's directions and ensure that washed surfaces do not differ from clean unwashed surfaces. Any difference will be considered unsatisfactory work.

3.4 FIELD QUALITY CONTROL

A. The Owner's Testing Agency shall:

1. Inspect erected timber framing as required to establish conformity of work with Drawings.

2. Inspect all bolted connections.

3. Inspect all timber connectors per CBC Section 2337A.2.

4. Inspect roof diaphragm nailing for nail size, spacing and penetration at plywood panel edges, and special nailing at collector and drag members.

5. Inspect anchor tiedown system and shear wall nailing for nail size, spacing and penetration at plywood panel edges, and nailing at tiedown posts.

END OF SECTION

SECTION 06-1600 - FRAMING AND SHEATHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural wall and roof framing.

B. Framing modifications as required for alterations.

C. Wall and roof sheathing, where indicated.

D. Wood furring, backing, and grounds.

E. Preservative treatment of wood.

1.2 REFERENCES

A. CBC – 2013 California Building Code.

B. CCR - California Code of Regulations Title 24, Part 2, Chapter 23A.

C. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.

D. ANSI/NFPA NDS-91 - National Design Specifications for Wood Construction.

E. APA - The Engineered Wood Association.

F. AWPA - American Wood Preservers' Association: Book of Standards.

G. AWPB - American Wood Preservers' Bureau.

H. NFPA - National Forest Products Association.

I. National Bureau of Standards - Product Standard PS-1-83 for Construction and Industrial Plywood.

J. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.

K. WWPA - Western Wood Products Association.

1.3 QUALITY ASSURANCE

A. Lumber Grading Agency: Certified by ALSC.

B. Plywood Grading Agency: Certified by APA.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC and California Code of Regulations, Title 24, Part 2.

B. Allowable stress design values shall be in compliance with the California Code of Regulations, Title 24, Part 2, Section 2316A and ANSI/AF&PA NDS-2012 National Design Specification (NDS) for Wood Construction.

1.5 SUBMITTALS

A. Submit product data under provisions of Section 01-1300.

B. Provide technical data on wood preservative materials and application instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of Section 01-1640.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: NFPA, WCLIB and WWPA. Lumber shall bear WCLIB grade stamp.

B. Beam Framing: Douglas Fir species, Dense No. 1 grade, 19 percent maximum moisture content (S-DRY).

C. Joist Framing: Douglas Fir species, No. 1 grade, 19 percent maximum moisture content (S-DRY).

D. Rafter Framing: Douglas Fir species, No. 1 grade, 19 percent maximum moisture content (S-DRY).

E. Structural Framing, Studs, Plate and Blocking: Douglas Fir Species, No. 1 grade, 19 percent moisture content (S-Dry).

F. Non-structural Light Framing Studs, Plate, and Blocking: Douglas Fir species, construction grade, 19 percent maximum moisture content (S-DRY).

G. Furring Strips: Redwood foundation grade.

2.2 PLYWOOD MATERIALS

A. Roof Sheathing: exterior Grade C-D, Exposure 1 minimum 5-ply construction, meeting product Doc PS 1 or Doc PS 2.

B. Wall Sheathing: APA, exterior Grade C-D Structural I, Exposure 1 minimum 5-ply construction, meeting product Doc PS 1 or Doc PS 2.

2.3 ACCESSORIES

A. Fasteners: Hot-dipped galvanized steel for exterior, high humidity, and treated wood locations; plain finish elsewhere; size and type to suit condition.

B. Connectors: As indicated.

C. Joist Hangers: Galvanized steel, sized to suit joists and framing conditions; manufactured by Simpson, Silver Teco or KC Metals.

D. Anchors: Thru bolt or anchor bolt to concrete or masonry unless otherwise noted. Bolt for anchorage to steel unless otherwise noted.

E. Building Paper: No. 15 asphalt felt. Plain untreated cellulosic building paper.

2.4 WOOD TREATMENT

A. Preservative Treatment: Where lumber or plywood is indicated as treated or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

B. Pressure treat all lumber in contact with ground with water-borne preservatives to comply with AWPB LP-22. After treatment kiln-dry lumber to a maximum moisture content of 19 percent.

C. Pressure treat above ground items with water-borne preservatives to comply with AWPB LP-2. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

2. Horizontal wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

3. Horizontal wood framing members less than 18 inches above grade.

4. Wood floor plates installed over concrete slabs directly in contact with earth.

5. Ends of wood girders entering masonry or concrete walls.

6. Framing members used in exterior door, window, or louver openings.

D. Complete fabrication of treated items prior to treatment, where possible. If cut or drilled after treatment, coat cut or drilled surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPA M4-99. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

3.1 FRAMING

A. Apply preservative to wood in contact or close proximity with concrete.

B. Erect wood framing members level and plumb.

C. Place horizontal members laid flat, crown side-up.

D. Construct framing members full length without splices.

E. Double members at openings over 1 sq ft. Space short studs over and under opening to stud spacing.

F. Construct double joist headers at floor and ceiling openings. Frame rigidly into joists.

G. Construct double joists under wall studding.

H. Bridge joists in excess of 8 feet span at mid-span members. Fit solid blocking at ends of members.

3.2 FURRING, BLOCKING AND GROUNDS

A. Provide wherever shown and where required for attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.

D. Firestop all concealed spaces of wood stud walls, ceilings and floor levels at 10 foot intervals both vertically and horizontally.

E. Firestop all concealed vertical and horizontal spaces as occur at soffits, vents, stair stringers, pipes and similar openings in compliance with Title 24, Part 2, Section 708.

F. Firestopping shall consist of closely fitted wood blocks of 2 inch nominal thickness lumber of same width as framing members.

3.3 SHEATHING

A. Secure wall sheathing perpendicular to wall studs, with ends staggered, over firm bearing.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01-4523.

3.5 TOLERANCES

A. Framing Members: 1/4 inch maximum from true position.

B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum.

END OF SECTION

SECTION 06-4100 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 06-6119 Quartz Surfacing Countertops

C. Sectiion 06-6200 Paper Composite Sheetgoods (Bid Alternate - Drawers, Doors and exposed sefaces)

1.2 SUMMARY

A. This Section includes the following:

1. Interior standing and running trim and rails.
2. Wood cabinets (casework).
3. Cabinet tops (countertops).
4. Interior miscellaneous ornamental items.
5. Interior door frames (jambs).

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 6 Section "Rough Carpentry" for furring, blocking, and other carpentry work that is not exposed to view.
2. Division 6 Section "Finish Carpentry" for carpentry exposed to view that is not specified in this section.
3. Division 8 Section "Flush Wood Doors" for doors specified by reference to architectural woodwork standards.
4. Division 9 Section "Painting" for final finishing of installed architectural woodwork.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product and process specified in this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

C. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Apply WIC Certified Compliance Label to first page of shop drawings.

D. Samples for initial selection purposes of the following in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of material indicated.

1. Plastic laminate.

E. Samples for verification purposes of the following:

1. Lumber with or for transparent finish, 50 square inches, for each species and cut, finished on one side and one edge.

2. Lumber Veneer leaves representative of and selected from flitches to be used for transparent finished woodwork.

3. Wood veneer faced panel products;, with or for transparent finish, 8-1/2 inches by 11 inches, for each species and cut with one half of exposed surface finished, with separate samples of unfaced panel product used for core.

4. Corner pieces as follows:

a. Cabinet front frame joints between stiles and rail as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.

b. Miter joints for standing trim.

5. Exposed cabinet hardware, one unit of each type and finish.

F. Product certificates signed by woodwork manufacturer certifying that products comply with Woodworkers Institute of California (WIC) standards.

G. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm experienced in successfully producing architectural woodwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Single-Source Responsibility: Arrange for production by a single firm of architectural woodwork with sequence matched wood veneers.

C. Installer Qualifications: Arrange for installation of architectural woodwork by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this project.

D. WIC Quality Standard: Comply with applicable requirements of "Manual of Millwork" published by Woodwork Institute (WI) unless otherwise indicated.

1. WI Quality Marking: Mark each unit of the following types of architectural woodwork with WIC Certified Compliance Label indicating quality grade required.

   a. Casework.

   b. Plastic laminate countertops.

E. Hardware Coordination: Distribute copies of approved scheduled for cabinet hardware specified in Division 8 Section "Finish Hardware" to manufacturer of architectural woodwork; coordinate cabinet shop drawings and fabrication with hardware requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.

B. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Obtain and comply with Woodwork Manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

PART 2 - PRODUCTS

2.1 HIGH PRESSURE DECORATIVE LAMINATE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high pressure decorative laminates which may be incorporated in the work include but are not limited to the following:

1. Formica Corp.
2. American Laminates.
3. Nevamar Corp.
4. or Approved Equal

B. See Section 12 12 3621 PAPER COMPOSITE panels for alternate material.

2.2 MATERIALS

General: Provide materials that comply with requirements of the WIC woodworking standard for each type of woodwork and WIC quality grade indicated, unless otherwise indicated.

A. Formaldehyde Emission Levels: Comply with formaldehyde emission requirements of each voluntary standard referenced below:

a. Medium Density Fiberboard: NPA 9.

b. Hardwood Plywood: HPMA FE.

2.3 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of cabinets and edges of solid wood (lumber) members less than 1 inch in nominal thickness: 1/16 inch.

2. Edges of rails and similar members more than 1 inch in nominal thickness: 1/8 inch.

C. Complete fabrication, including assembly, finishing, and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Factory-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges of cutouts with a water-resistant coating.

2.4 STANDING AND RUNNING TRIM AND RAILS FOR TRANSPARENT FINISH

A. Quality Standard: Comply with WIC Section 10 "Interior Trim."

B. Backout or groove backs of flat trim members and kerf backs of other wide flat members, except for members with ends exposed in finished work.

C. Assemble casings in plant except where limitations of access to place of installation require field assembly.

D. Grade: Custom.

E. Lumber Species:

1. American Cherry at Cabinet trim.

2.5 STANDING AND RUNNING TRIM AND RAILS FOR OPAQUE FINISH

A. Quality Standard: Comply with WIC Section 10 "Interior Trim."

B. Grade: Custom.

C. Backout or groove backs of flat trim members and kerf backs of other wide flat members, except for members with ends exposed in finished work.

D. Assemble casings in plant except where limitations of access to place of installation require field assembly.

E. Lumber Species: American Cherry at window stools and tackwall trim.

2.6 LAMINATE CLAD CABINETS (PLASTIC-COVERED CASEWORK)

A. Quality Standard: Comply with Woodwork Institutes Section 15 "Casework - laminated Plastic."

B. Grade: Custom.

C. WI Construction Style: 3/4" thick Style A Frameless.

D. WI Construction Type: Type I multiple self-supporting units rigidly joined together.

E. WI Door and Drawer Front Style: 3/4" thick - Flush overlay.

F. Laminate Cladding: High pressure decorative laminate complying with the following requirements:

1. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

    a. Provide selections made by Architect from laminate manufacturer's full range of standard colors and finishes in the following categories:

        1) Solid colors.

        2) Patterns.

2. Laminate Grade for Exposed Surfaces: Provide laminate cladding complying with the following requirements for type of surface and grade.

    a. Horizontal Surfaces Other Than Tops: GP-50 (0.050-inch nominal thickness).

    b. Vertical Surfaces: GP-50 (0.050-inch nominal thickness).

    c. Edges: 3mm. PVC matching laminate in color, pattern, and finish.

3. Semiexposed Surfaces: Provide surface materials indicated below:

    a. High pressure laminate, CL-20.

2.7 CABINET HARDWARE AND ACCESSORY MATERIALS

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Finish Hardware."

B. Cabinet Hardware Schedule:

C. Acceptable Manufacturer: Salice, Knapp & Vogt, Builders Brass Works, Stanley, Grant or approved equal.

D. Hinges: Pair Stanley “F” series, 2 ½” full mortise - 5 barrel hinge with hospital tips, satin chrome.

E. Drawer Slides:

1. Drawer depth 8” or less: Accuride #3832, 100 lb. full extension , steel ball bearing

2. Drawer depth over 8”: Accuride # 3025, 125 ld. full extension, steel ball bearing

F. Door & Drawer Pulls: Hafele Catalog # 109.80.401

G. Catches: Recessed magnetic catches – Hafele # 24643.758

H. Elbow catches – Hafele # 245.74.200

I. Rim locks: Haffel # 232.04.211 and 232.04.266

J. Shelf Standards: Grant #120 with #21 shelf support

K. All cabinets and drawers to have rim lock, satin Chrome plated, keyed different for each room.

L. Hardware Standard: Comply with ANSI/BHMA A156.9 "American National Standard for Cabinet Hardware" for items indicated by reference to BHMA numbers or referenced to this standard.

M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA code number indicated.

1. Satin Chromium Plated, Brass or Bronze Base: BHMA 626.

N. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of ANSI/BHMA A156.9.

2.8 ARCHITECTURAL CABINET TOPS (COUNTERTOPS)

A. Quality Standard: Comply with manufactures recommneded installation manual and instructions.

B. Type of Top: Engineered Quartz Stone See specifications 06-6119

2.9 INTERIOR MISCELLANEOUS ORNAMENTAL ITEMS FOR TRANSPARENT FINISH

A. Quality Standard: Comply with WIC Section 11 "Miscellaneous Interior Millwork."

B. Grade: Custom.

C. Lumber Species: Match species and cut indicated for other types of transparent finished architectural woodwork located in same areas of building unless otherwise indicated.

2.10 INTERIOR MISCELLANEOUS ORNAMENTAL ITEMS FOR OPAQUE FINISH

A. Quality Standard: Comply with WIC Section 11 "Miscellaneous Interior Millwork."

B. Grade: Custom.

C. Lumber Species: Eastern white pine, sugar pine, or Idaho white pine.

2.11 INTERIOR DOOR FRAMES FOR OPAQUE FINISH

A. Quality Standard: Comply with WIC Section 12 "Interior Jambs."

B. Grade: Custom.

C. Lumber Species: Eastern white pine, sugar pine, or Idaho white pine.

2.12 FASTENERS AND ANCHORS

A. Screws: Select material, type, size, and finish required for each use. Comply with FS FF-S-111 for applicable requirements.

B. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

C. Anchors: Select material, type, size, and finish required by each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

2.13 FACTORY FINISHING OF INTERIOR ARCHITECTURAL WOODWORK

A. Quality Standard: Comply with WIC Section 25, "Factory Finishing of Architectural Woodwork," unless otherwise indicated.

B. General: The entire finish of interior architectural woodwork is specified in this section, regardless of whether factory applied or applied after installation.

1. Factory Finishing: To the greatest extent possible, finish architectural woodwork at factory. Defer only final touch-up, cleaning, and polishing until after installation.

C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.

D. Transparent Finish for Open-Grain Woods: Comply with requirements indicated below for grade, finish system, staining, effect, and sheen, with sheen measured on 60 deg gloss meter per ASTM D 523.

1. Grade: Custom.

2. WIC Finish System #2: Water Reducible Acrylic Lacquer.

3. Staining: To be selected by architect.

4. Sheen: Dull satin 15-20 deg.

E. Transparent Finish for Closed-Grain Woods: Comply with requirements indicated below for grade, finish system, staining, effect, and sheen.

1. Grade: Custom.

2. WIC Finish System #2: Water Reducible Acrylic Lacquer.

3. Staining: to be selected by architect.

4. Sheen: Dull satin 15-20 deg.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installing.

B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.

C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with WIC Section 26 for same grade specified in Part 2 of this section for type of woodwork involved.

B. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 8'-0" for plumb and level (including tops) and with no variations in flushness of adjoining surfaces.

C. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

D. Anchor woodwork as indicated on drawings.

E. Standing and Running Trim and Rails: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns and miter at corners.

F. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated. Maintain veneer sequence matching (if any) of cabinets with transparent finish.

G. Tops: Anchor securely to base units and other support systems as indicated.

H. Complete the finishing work specified in this section to whatever extent not completed at shop or before installation of woodwork.

3.3 ADJUSTMENT AND CLEANING

A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures that woodwork is being without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 06-6119 ENGINEERED QUARTZ COUNTERTOP

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. Section Includes: Quartz surfacing for:

1. Countertops
2. Backsplashes

B. Related Sections

1. Division 1 -Administrative, Procedural and Temporary Work Requirements
2. Division 6 - Section Rough Carpentry for Blocking
3. Division 7 - Section Joint Sealers
4. Division 15- Plumbing Fixtures
5. Division 16 - Wiring Devices
6. Coordinate sink cutouts and other penetrations with other trades.

1.3 REFERENCES:

A. ASTM International

1. ASTM C97 - Absorption and Bulk Specific Gravity of Dimension Stone
2. ASTM C99 - Modulus of Rupture of Dimension Stone
3. ASTM C170 - Compressive Strength of Dimension Stone
4. ASTM C217 - Weather Resistance of Slate
5. ASTM C482 - Bond Strength of Ceramic Tile to Portland Cement

6. ASTM C484 - Thermal Shock Resistance of Glazed Ceramic Tile

7. ASTM C501 - Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser

8. ASTM C531 - Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

9. ASTM C880 - Flexural Strength of Dimension Stone

10. ASTM C1026 - Resistance of Ceramic Tile to Freeze-Thaw Cycling

11. ASTM C1028 - Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

12. ASTM C 1243- Relative Resistance to Deep Abrasive Wear of Unglazed Ceramic Tile by Rotating Disc

13. ASTM D256 - Izod Pendulum Impact Resistance of Plastics

14. ASTM D2047 - Static Coefficient of Friction of Polish-Coated Floor Surfaces by the James Machine

15. ASTM E84 - Surface Burning Characteristics of Building Materials

B. American National Standards Institute (ANSI)

1. ANSI Z124.6 - Stain Resistance

2. ANSI/N 42.14- Radiation

C. National Electrical Manufacturers Association (NEMA)

1. NEMA LD3-3.5 - Boiling Water Resistance

2. NEMA LD 3-3.6 - High Temperature Resistance

D. Others

1. NSF - ANSI/NSF Standard 51

2. OHSAS - 18001- Occupational Health & Safety System

3. GREENGUARD - "Children and Schools"

4. SCS - Certified recycled content

1.4 SUBMITTALS

A. Product Data

1. Quartz Surfacing: Submit manufacturer's product data, sample warranty form,] and fabrication and installation instructions.

2. Accessories: Submit manufacturer's product data and installation instructions.

B. Shop Drawings: Identify color and finish, and show the following:

1. Field-verified dimensions

2. Quartz surfacing dimensions

3. Locations and dimensions of cutouts

4. Required locations of support and blocking members

5. Edge profiles

6. Installation details and methods

C. Samples

1. Cut sample and seam together for representation of seaming techniques.

2. Indicate full range of color and pattern variation.

3. Samples for Color Approval: Submit two samples, 10 x 5 inches, of each color and finish of proposed manufacturer matching design standard referenced by architect under products.

4. Stone Adhesive: Submit two samples of an adhesive joint for each color quartz surfacing selected. Show color match of adhesive.

D. Fabricator Qualifications: Submit evidence of fabricator's qualifications.

E. Closeout Submittals: Submit completed warranty form.

F. Product Certificates: For each type of product, provide product certificates signed by product manufacturer.

G. Maintenance Data

1. Submit manufacturer's care and maintenance data.

2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

A. Applicable Standards

1. Standards of the following, as referenced herein:

a. American National Standards Institute (ANSI)

b. American Society for Testing and Materials (ASTM)

c. National Electrical Manufacturers Association (NEMA)

d. NSF International

2. Fire Test response characteristics

a. Provide with the following Class A (Class 1) surface burning characteristics as evidenced by testing identical products against ASTM E84 (UL 723) or another testing and inspecting agency acceptable to authorities having jurisdiction.

b. Flame Spread Index: 25 or less

c. Smoke Developed Index: 450 or less

B. Allowable Tolerances

1. Variation in component size ± 1/8" (3mm) over a ten (10) foot length

2. Location of openings: ± 1/8" (3mm) from indicated location

3. Maximum 1/8" (3mm) clearance between quartz surfaces and each wall

1.6 DELIVERY, STORAGE. AND HANDLING

A. Packaging, Shipping, Handling, and Unloading

1. Observe manufacturer's recommendations and handle accordingly in order to prevent breakage or damage.

2. Brace parts if necessary.

3. Transport in the near-vertical position with finished face turned toward finished face.

4. Do not allow finished surfaces to rub during shipping or handling.

B. Storage and Protection

1. Store in racks in near-vertical position.

2. Prevent warpage and breakage.

3. Store inside away from direct exposure to sun.

4. Store between 25°F and 130°F (-4 °C and 540C).

5. Store with finished face turned toward finished face.

1.7 WARRANTY

A. Provide manufacturer's Limited Commercial 10-Year Warranty against product defects when fabricated and installed by manufacture's certified fabricator.

PART 2 - PRODUCT

2.1 MANUFACTURERS

A. Acceptable Manufacturer:

1. Radianz by Samsung, Local supplier Arizona Tile, Livermore CA contact Cynthea Szeredy, Cynthea Szeredy@arizonatile.com. (Project Design Standard)

2. Caesarstone Quartz Surfacing distributed by U.S. Quartz Products Inc. (Caesarstone U.S.A., Inc.); Van Nuys, CA; phone 877-9-QUARTZ (978.2789); www.caesarstoneus.com.

3. Zodiaq manufactured by DuPont

4. Approved Equal, See Section 01-6100 Product Substitutions

2.2 QUARTZ SURFACING

A. Composition: 93 percent crushed quartz aggregate combined with resins and pigments and fabricated into slabs using a vacuum vibro-compaction process.

B. Dimensions

1. Thickness: Nominal: 3/4 inch (20 mm).

2. Edge Lamination: 1 1/2" thick

3. Size: Slabs shall be not less than 56.5 x 120 inches to minimize the number of joints used in installation.

C. Identification: Material shall be labeled with a batch number and imprinted with a manufacturer's identifying mark on the back.

D. Performance - Quartz Surfaces Technical Data

Test Performed	Test SIa,idiid	Results
Water Absorption	ASIM C97	< 0.05%
Density	ASIM C97	2 2.24 gr/cm
Flexural Strength	ASTM C880	6,500-10,770 psi, 44. 8-74 3 MPa
Dimension Stability	EN 1461 7-ti	Class A
Impact Resistance	ASTM D1709	26 3 lbs
Compressive Strength	ASTM C170	11312- 27.133 psi
Abrasion	ASTM C501	216-696
	ASTM C1243	Volume of chord V=132-244 mm
Freeze-Thaw Resistance	ASTM C1026	No defects after 15 freeze-thaw cycles
Mohs Hardness Scale		6.5-7
Stain Resistance	ANSI Z124.6	Pass
Wear and Cleariability	ANSI Z124.6	Pass
Chemical Resistance	ANSI Z124.6	Pass
Linear Thermal Expansion	ASTM D696	-30 to +30 C 1.3-1.9 x 10^5 cm/cm/ C^o
Thermal Conductivity	EN 12664/ISO 8301	1.75W/m) / K (mean I of 10 C)
Thermal Shock	EN 14617-6	No visual defects after 10 cycles Loss in mass= 0 02%-0.05% Loss in flexural strength = 07% - 1.1%
Boiling Water Resistance	NEMA 103-3.5	Pass
High Temperature Resistance	NEMA 103-3.6	Pass
Cigarette Test	ANSI Z124.6	Pass
Surface Burning	ASTM E84	Class 1 and Class A

Static Coefficient of Friction	ASTM C1028	As received Dry 0.8. Wet 0.6 As renovated - Dry 0.9. Wet 0.6
Radiation	ANSI/N 42 14	Ra = 1.4 - 6.8 Th = 1.4-3 K = <3-30.3 (Bq/kg dry weight)

E. Certifications and Approvals

1. OHSAS 18001 Health and Safety Systems
2. GREENGUARO Certified for indoor Air Quality" and "Children and Schools"
3. Scientific Certification Systems (SOS) Recycled Content

F. Color and Finish

1. Provide color and finish selected by architect from manufacture's selection that matches one of the following Project Design Standard Colors (Samsung Radianz).
   a. Bristol Beige - BB227
   b. Cascade Pebble - CP350
   c. Cumberland Flax - CF350
   d. Rocky Mountain Brown - RB470
2. Finish
   a. Polished surface shall have gloss greater than or equal to 35% at 50^0.

G. Exposed Edges and Corners

1. Countertops
   a. Edges: Square with eased edge.
   b. Outside Corners: 3/4 inch radius]
2. Backsplash

a. Edges: Square

b. Outside Corners: Square butt joints

2.3 ACCESSORIES

A. Mounting Adhesives

1. Provide structural-grade silicone or epoxy adhesives as recommended by manufacturer for application and per conditions of use.

2. Acceptable Silicone Manufacturers

a. Dow Corning

b. GE Sealants and Adhesives

3. Acceptable Epoxy Manufacturers

a. Akemi North America

b. Bonstone Materials Corporation

c. Tenax U.S.A.

4. Provide spacers, if required, of type recommended by adhesive manufacturer.

B. Stone Adhesive

1. Provide epoxy or polyester adhesive of type recommend by manufacturer for application and conditions of use.

2. Acceptable Manufacturers

a. Akemi North America

b. Bonstone Materials Corporation

c. Tenax U.S.A.

3. Color: Adhesive that will be visible in finished work should be tinted to match quartz surfacing.

C. Joint Sealants

1. Clear silicone sealant as recommended by manufacturer for application and per conditions of use.

2. Provide anti-bacterial type in food preparation areas

3. Acceptable Manufacturers:

a. Dow Corning

b. GE Sealants and Adhesives.

D. Solvent: Product recommended by adhesive manufacturer to clean surface of quartz surfacing to assure adhesion of adhesives and sealants.

E. Cleaning Agents: Non-abrasive, low pH cleansers. Include manufacturer authorization if manufacturer's warranty is specified.

2.4 FABRICATION

A. Fabricator: Firm shall have five years' experience fabricating architectural stone and shall have water-cooled cutting tools.

B. Shop Assembly: Observe proper safety procedures and comply with manufacturer's instructions.

C. Layout: Layout joints to minimize joints and to avoid L-shaped pieces of quartz surfacing.

D. Inspect Material

1. Inspect material for defects prior to fabrication.

2. Color Match

a. Materials used throughout the project shall be from the same batch and bear labels with the same batch numbers.

b. Visually inspect materials to be used for adjacent pieces to ensure acceptable color match.

c. Inspect in lighting conditions similar to those existing at the jobsite.

3. Variation in distribution of aggregates in quartz surfacing that is within manufacturer's tolerances is not a defect.

E. Tools: Cut and polish with water-cooled power tools.

F. Cutouts

1. Cutouts shall have 3/8 inches (10 mm) minimum inside corner radius. Inside corners shall be reinforced in an acceptable manner to prevent cracking.

2. Polish edges where they will be exposed in finished work.

3. If the remaining material outside a cutout is less than three inches wide, reinforce area by laminating it with a strip of quartz surfacing.

G. Laminations: Laminate layers of quartz surfacing as required to create built-up edges and other areas requiring additional thickness.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLER

A. Installer: Firm shall have five years' experience installing architectural stone.

3.2 EXAMINATION

A. Site Verification

1. Verify dimensions by field measurements prior to fabrication.

2. Verify that substrates supporting quartz surfaces are plumb, level, and flat to within 1/16 inch in ten feet (1.6 mm in 3000 mm), and that necessary supports and blocking are in place.

3. Base Cabinets: Cabinet units shall be securely fixed to adjoining units and back wall.

B. Materials Review

1. Inspect finished surfaces for damage.

2. Do not install until damaged materials have been repaired or replaced in an acceptable manner.

3.3 PREPARATION

A. General

1. Protect finished surfaces against scratches.

2. Apply masking where necessary.

3. Guard against grit, dust, and other potentially abrasive dirt or residue.

3.4 INSTALLATION

A. General

1. Install materials in accordance to manufacturer's recommendations.

2. Lift and place carefully to avoid breakage.

B. Preliminary Installation and Adjustment

1. Position materials to verify correct sizing and preparation.

2. Make necessary adjustments.

3. If cutting, grinding, or polishing is required at the jobsite, use water-cooled tools.

4. Protect jobsite and surfaces against dust and water.

5. Perform work away from installation site, if possible.

6. Allow gaps for expansion of not less than 1/16 inch (1.5 mm) per five feet when installed between walls or other fixed conditions.

7. Drainage: Adjacent to sinks andwhere drainage is required, shim countertops slightly to ensure positive drainage.

C. Permanent Installation

1. After verifying fit:

   a. Remove quartz surfacing from position.

   b. Clean substrates of dust and contamination.

   c. Clean quartz surfacing back side and joints with solvent.

2. Apply sufficient quantity of mounting adhesive in accordance with adhesive manufacturer's recommendations to provide permanent, secure installation.

3. Spacing of mounting adhesive shall not exceed:

   a. Horizontal surfaces: 12 inches on center

   b. Vertical surfaces: 6 inches on center; provide temporary shims until adhesive cures

4. Install surfacing plumb, level, and square and flat to within 1/16 inch in ten feet (1.6mm in 3000 mm).

D. Joints

1. Joints between adjacent pieces of quartz surfacing

a. Joints shall be flush, tight fitting, level, and neat.

b. Securely join with stone adhesive.

c. Fill joints level with quartz surfacing.

d. Clamp or brace quartz surfacing in position until adhesive sets.

2. 2. Joints between backsplashes and countertops. Seal joints with anti-bacterial silicone sealant.

3.5 REPAIR

1. Repair or replace damaged materials in a satisfactory to the architect and owner.

3.6 CLEANING

A. Remove masking and excess adhesives and sealants. Clean exposed surfaces.

3.7 PROTECTION

A. Protect surfacing from damage by other Trades.

3.8 SCHEDULE

A. Kitchen countertops

1. Color / Pattern: To be selected by Architect.

2. Thickness: 3/4 inch.

3. Edge Thickness: 1 1/2" laminated built up, see drawings.

4. Edge: Square with eased edges, see drawings

END OF SECTION

SECTION 07 0150– RE-ROOFING PREPARATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of existing roofing assembly in preparation for a new membrane or roofing repairs as specified in related section(s).

B. Remove and re-install existing skylights, roof hatches and other roof accessories as indicated.

C. Fill-in indicated existing openings with wood framing and sheathing of type and size to match existing construction.

D. Salvaging, storing, and protecting existing work to remain or to be removed and re-installed.

1. Refer to items as indicated.

1.2 RELATED SECTIONS

A. Section 01010 - Summary: Work

B. Section 01030 - Alteration project procedures

C. Section 01500 - Temporary Facilities: and Control

D. Section 02050 - Demolition, Cutting and Patching

E. Section 07600 - Misc. Sheet Metal and Flashing

F. Section 07610 - Metal Roofing

1.3 PROJECT CONDITIONS

A. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

B. Schedule work to coincide with commencement of installation of new roofing system.

C. Remove only existing roofing materials that can be replaced with new materials the same day.

D. Coordinate the work with other affected mechanical and electrical work associated with roof penetrations.

E. Do not disable or disrupt building fire or life safety systems without 10 (ten) days' prior written notice to Owner.

F. Do not close or obstruct egress from any building exit or site exit.

G. Conduct roof removal to minimize interference with adjacent and occupied building areas.

H. Use all means necessary to protect existing objects, construction and plantings designated to remain. In the event of damage, make all repairs and replacements necessary for approval of Architect at no additional cost to the Owner.

I. Protective measures: Provide all necessary safeguards, including warning signs and lights, barricades, and the like, for protection of the public, Contractor's employees and existing improvements during demolition. Prevent access of unauthorized persons to area of work

J. Provide at least one person who shall be present at all times during execution of this portion of the work, be thoroughly familiar with the type of work being performed and the best methods for its execution and who shall direct all work performed under this Section.

K. Control the use of water to prevent damage to the existing facilities to remain. Provide wet vacuum equipment where water, such as waste cooling water from concrete sawing or water used as dust emollient, is used adjacent to and in existing buildings.

L. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

1.4 SCHEDULING

A. Schedule work under the provisions of Section 01120.

B. Schedule work to coincide with new construction.

C. Coordinate preparation for roofing with other trades to assure the proper sequence, limits, methods and time of performance. Schedule work so as to impose a minimum of hardship on the present operation of facilities and the performance of the work of other trades or contracts.

D. Describe removal procedures and schedule.

E. Perform noisy, malodorous, or dusty work:

1. Between the hours of 7:00 am and 5:00 pm.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Notify local Agency with regulatory authority and obtain necessary approval or permits prior to commencing with work

B. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.

C. Maintain continuous temporary protection prior to and during installation of new roofing system.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Temporary Protection: Sheet polyethylene; provide weights and temporary fasteners to retain sheeting in position.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing roof surface is clear and ready for work of this section.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers at locations required to prevent unauthorized access to area of work.

B. Inspect the area of work and verify locations of all items designated to be removed or preserved.

C. Do not begin work until temporary barricades, warning signs and other forms of protection are installed.

D. Erect and maintain weatherproof closures for exterior openings.

E. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued occupancy of adjacent buildings.

F. Protect existing equipment, materials and features that are not to be demolished or removed for re-installation.

G. Prevent movement of structure; provide bracing and shoring.

1. Be responsible for the adequacy and design of all temporary shoring and bracing systems.

H. Notify affected utility companies before starting work and comply with their requirements.

1. Mark location and termination of utilities.

2. Provide appropriate temporary signage including signage for exit or building egress.

I. Sweep roof surface clean of loose matter.

J. Remove loose refuse and dispose off site.

3.3 MATERIAL REMOVAL

A. Disconnect, cap, and identify designated utilities within removal areas.

B. Remove skylights, hatches, exhaust fans, hoods and similar items. Store and protect elements identified for re-installation.

C. Securely cover roof penetration openings where items have been removed. Prevent intrusion of water, weather, foreign objects, or roofing materials into building.

D. Remove metal counter flashings.

E. Remove existing shingle roof system down to the deck surface:

1. Remove shingles, perimeter flashings, flashings around roof protrusions, and other elements.

2. Remove underlayment.

3. Existing gutters: Where new gutters are indicated, remove existing. Protect existing gutters noted to remain.

F. Remove existing membrane roof system down to the deck surface:

1. Scrape roofing gravel from membrane surface.

2. Remove roofing membrane, perimeter base flashings, flashings around roof protrusions, pitch pans and pockets and roof drains.

3. Remove insulation and fasteners, cant strips, blocking, and other elements.

G. Repair existing wood deck surface to provide smooth working surface for new roof system, clean and dry.

H. Work not mentioned to be removed that interferes with new construction shall be cut to clean cut lines to provide for proper interface with new construction, or patching and repair, as required for scope of work indicated.

3.4 TEMPORARY PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with temporary fasteners.

C. Provide for surface drainage from sheeting to existing drainage facilities.

D. Do not permit traffic over unprotected or repaired deck surface.

3.5 SALVAGE

A. Items indicated to be re-installed shall be removed carefully, cleaned and stored in a protected location on or off the site until re-installed.

B. Owner may take possession of any items of salvage for his use if he desires. Provide incidental labor to relocate designated salvage for Owner's storage.

3.6 PATCHING

A. Patch materials to remain when damaged by this work. Finish materials and appearance of the patch or repair work shall match the existing contiguous materials and finishes in all respects and shall be approved by Architect.

B. Where materials are removed oversize or in improper location, replace the excess removed material as instructed by Architect at no additional cost to the Owner.

3.7 REINSTALLATION

A. Re-Install removed items that are not being replaced or abandoned securely attaching with a watertight, weatherproof installation.

3.8 CLEAN UP AND DISPOSAL

A. Debris, waste, and removed materials, other than items to be salvaged, are Contractor's property for legal disposal off the site, as required by applicable Federal and State regulations. Continuously clean up and remove these items. Do not allow removed items to accumulate.

B. Leave the site in a neat and orderly condition prepared for the work of other trades.

3.9 SCHEDULES

A. All Roof Areas: Remove existing roofing gravel, perimeter flashings, base flashings, counter flashings, vent stack flashings, roofing membrane, and composition shingles and underlayment. Remove existing gutters where noted to be replaced.

B. Remove all roof mounted hatches, smoke vents, attic vents, and mechanical equipment and electrical equipment as necessary to allow access to roof surfaces for re- roofing. Re-install indicated following completion of re-roofing activities. Confirm water-tight installation and all required functional and operational characteristics upon completion.

END OF SECTION

SECTION 07 1416.2 - RESTORATION COATING FOR BUILT UP ROOF

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Installation of restoration coating at existing Built up roofing.

2. Installation at new builtup roof patched areas and curbs.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 7 Section Built Up asphalt roofing.

2. Division 7 Section "Flashing and Sheet Metal" for metal counter flashings.

3. Division 7 Section "Roof Specialties and Accessories" for prefabricated curb units.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specifications Sections.

B. Product data, including manufacturer's technical product information, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer (Roofer) to perform built-up asphalt roofing work who has specialized in installing roof coating systems similar to that required for this Project and who is acceptable to manufacturer of primary roofing materials.

1. Installer's Field Supervision: Require Installer to maintain a full-time supervisor/foreman who is on job site during times that built-up asphalt roofing work is in progress and who is experienced in installing roofing systems similar to type and scope required for this Project.

B. Manufacturer Qualifications: Obtain primary products from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products to use with roofing system specified.

C. UL Listing: Provide roof coating system and component materials that have been tested for application and slopes indicated and that are listed by UL for Class A or B external fire exposure.

1. Provide roof-covering materials bearing UL Classification Marking on bundle, package, or container indicating that materials have been produced under UL's Classification and Follow-up Service.

D. Preapplication Roofing Conference: Approximately 2 weeks prior to scheduled commencement of built-up roofing installation and associated work, meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work--including mechanical work, Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with work performance, including Owner's insurers, test agencies, and governing authorities, where applicable.

1. Review foreseeable methods and procedures related to roofing work, including, but not necessarily limited to, the following:

a. Review foreseeable methods and procedures related to roofing work, including but not necessarily limited to the following:

b. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by other trades.

c. Review roofing system requirements (drawings, specifications, and other contract documents).

d. Review required submittals, both completed and yet to be completed.

e. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

f. Review required inspection, testing, certifying, and material usage accounting procedures.

g. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).

2. Record (Contractor) discussions of conference, including decisions and agreements or disagreements reached, and furnish a copy for each attendee. If substantial disagreements exist at the conclusion of the conference, determine how disagreements will be resolved and set a date for reconvening the conference.

E. Contractor to provide a moisture test (scan) of the existing roof by an independent testing agency accepted by product supplier and Owner.

1. Moisture test must be less than 20% prior to proceeding with work.

1.5 PROJECT CONDITIONS

A. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed according to manufacturers' recommendations and warranty requirements.

1.6 SUBSTRATE CONDITIONS

A. The Roofing System is to be applied over dry, sound asphaltic fiberglass or modified bitumen granule cap sheets only. Verify roof has a positive drainage.

1. Fiberglass or modified bitumen granule cap sheets must be older than 30 days.

2. Do not apply products over friable and/or brittle roofing.

3. Substrate should not pond water for a period longer than 48 hours after precipitation stops.

B. Test patches shall be prepared in representative roof areas to check adhesion of coating products before application on any roofs having fiberglass or modified bitumen granule cap sheets.

1. Products will not adhere to any existing silicone-based coatings.

C. The bonding surface must be free of ponding water, ice, snow, splits, oils, grease and debris.

D. If the moisture scan reveals more than 20% of the roof area is wet, Notify Architect.

1.7 WARRANTY

A. Provide: 5 year Manufacturers Product warranty to Owner.

1. Submit a copy of Moisture test results to manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. GAF Materials Corporation

B. or approved Equal

2.2 MATERIALS - GENERAL

A. TOPCOAT® Flashing Grade TOPCOAT® Flashing Grade (light gray), water-based 100% acrylic synthetic rubber sealant which to be applied to seams, fasteners, flashings, and penetrations prior to the application of the TOPCOAT® Elastomeric Roofing Membrane.

1. Do not apply at temperatures below 42°F. Substrate temperatures must be below 120°F when applying product

a. Application Rate (seams): 5 gallons/125 ft. (6” width) Application Method: Brush or caulking gun

b. Application Temp (air, surface): 42° - 120°F

c. Drying Time (75°F, 50% RH): Approximately 24 hours

d. Wet Mil Thickness: 105 wet mils

e. Dry Mil Thickness: 60 dry mils

f. Total Solids (by weight): 68% ± 1%

g. Total Solids (by volume): 56% ± 2%

h. Specific Gravity: 1.44 ± 0.1

i. Tensile: 225 psi ± 10%

j. Weight per Gallon: 12.0 ± 0.5 lbs

k. Viscosity (75°F): 225,000 ± 22,500 cps

l. Clean-up: Water before curing

B. TOPCOAT® FlexSeal TOPCOAT® FlexSeal is a solvent-based, synthetic rubber sealant designed for use in a wider range of temperatures.

1. Application temperatures above 32°F.

2. Substrate temperatures must be below 120°F.

3. Application Rate (seams): 5 gallons total/100 ft.

4. Application Method: Trowel or stiff bristle brush Application Temperature (air, surface): 32° - 120°F

5. Drying Time (75°F, 50% RH): Approximately 24 hours

6. Wet Mil Thickness: 85 wet mils

7. Dry Mil Thickness: 50 dry mils

8. Total Solids (by weight): 77% ± 2%

9. Total Solids (by volume): 66% ± 2%

10. Specific Gravity: 1.24 ± 0.1 Weight per Gallon: 10.3 ± 0.5lbs Viscosity (75°F): 600,000 ± 100,000 cps LV-Viscosity (75°F): 150,000 ± 15,000 cps

11. Tensile: 485 psi ± 10% Storage:

C. TOPESTER Reinforcing Fabric

1. TOPESTER Fabric is a non-woven, spun bonded 100% polyester web that must be used in conjunction with TOPCOAT® Flashing Grade at all penetrations, joints, or changes in plane that are subjected to high shear or stress.

a. Average Weight (Ounces per square yard) per ASTM D1117: 1.5

b. Average Tensile Strength per ASTM D1628: 44 psi

c. Average Elongation at break per ASTM 1628: 53%

d. Trapezoidal Tear Strength per ASTM D2263: 18.5 lbs

D. TOPCOAT® MB Plus

1. TOPCOAT® MB Plus is a water-based acrylic low VOC, sprayable polymeric liquid, which cures to form a seamless rubber membrane. Meeting the stringent standards set by the Cool Roof Rating CouncilSM for solar reflectance and thermal emittance.

a. Color: white

b. Application Rate: 1.0 to 3.0 gallons/100 sq.ft. total Application Method: Airless sprayer or roller Application Temp (air, surface): 42° - 120°F Drying Time (75°F, 50% RH): Approximately 24 hours per coat

c. Wet Mil Thickness: (1.0 Gallon/100SF) - 16 wet mils

d. Dry Mil Thickness: (1.0 Gallon/100SF) - 9 dry mils

e. Total Solids (by weight): 65% ± 2%

f. Total Solids (by volume): 54% ± 2%

g. Specific Gravity: 1.32 ± 0.1

h. Weight per Gallon: 11.0 ± 0.5 lbs.

i. Viscosity (75°F): 15,000 ± 2,000 cps

j. Tensile Strength: 150 psi

k. Elongation: 275%

l. Clean-up: Water before curing

PART 3 - PART 3 - EXECUTION

3.1 PREPARATION OF SUBSTRATE

A. Examine substrate to receive new coating. Do not proceed with new roofing until adhesion has been verified by test patches, other preparatory work has

been completed and unsatisfactory conditions have been corrected in a manner acceptable to the Product Manufacturer.

B. Treatment of Damaged/Deteriorated BUR or MB: Any areas where BUR or MB has blistered, buckled and/or become wet must be removed and repaired using similar products manufactured by GAF Materials Corporation

1. New BUR or MB repair materials must be allowed to weather at least 30 days before applying TOPCOAT® products to these repaired areas).

2. All areas where the fiberglass or modified granule cap sheet has significantly cracked and/or crazed (i.e., gaps in width and/or depth greater than 1/16") must be repaired using TOPCOAT® FlexSeal to bring the substrate to a smooth, workable surface.

3. TOPCOAT® FlexSeal can be applied by either squeegee or brush when repairing cracks and/or crazing. Allow at least 24 hours drying time before application of other TOPCOAT® products.

C. Substrate Cleaning: Roof substrate must be carefully swept to remove debris and loose granules. Then lightly pressure wash the roof with water. Use an approximate working pressure of 1,500 - 2,000 psi (depending on condition of roof) to remove remaining dirt, dust, chalking, loose materials, etc. Take care not to damage the roof surface or force water into the roof system. Use hot water and mild detergent to remove grease and/or oils from the roof substrate. If mildew or algae are present, use bleach to treat these areas.

D. Substrate must be clean, completely dry and free of any debris before application of coating products.

3.2 APPLICATION OF SURFACE SEAL SB SYSTEM

A. All roof penetration areas, splits, drains, and scuppers must be treated with a 6" wide area of TOPCOAT® FlexSeal, one layer of 6" TOPESTER Fabric and a final layer of SB-900 Flashing Grade to completely embed the Fabric. Feather the FlexSeal onto the existing fiberglass or modified bitumen granule cap sheet substrate.

B. After at least 24 hours drying time, inspect preparatory/flashing work for problem areas (i.e., gaps, cracks, fishmouths, air pockets, etc.) to ensure that work is complete and satisfactory. Repair any deficiencies using TOPCOAT® FlexSeal and TOPESTER Fabric, as required.

C. Coating Application:

1. Spray-apply base coat of TOPCOAT® Surface Seal SB at a rate of 1.25 gallons per 100 sq.ft. Allow at least 24 hours drying time and inspect the base coat for defects, flaws, or holidays. Correct any unsatisfactory conditions prior to proceeding.

2. Spray-apply finish coat (same color as base coat) of TOPCOAT® Surface Seal SB at a rate of 1.75 gallons per 100 sq.ft. Finish coat should not be applied unless the base coat is clean and will provide proper adhesion.

3. Allow at least 24 hours drying time prior to allowing foot traffic or inspection of the roof. After 24 hours has elapsed, inspect the final roof surface for flaws, holidays, insufficient thickness, etc., and repair any unsatisfactory conditions. Specified membrane thicknesses are minimum 24 mils field and 80 mils on roof penetration details.

3.3 APPLICATION OF MB PLUS SYSTEM

A. All roof penetration areas, splits, drains, and scuppers must be treated with a 6" wide area of TOPCOAT® Flashing Grade, one layer of 6" TOPESTER Fabric and a final layer of Flashing Grade to completely embed the Fabric. Feather the Flashing Grade onto the existing fiberglass or modified bitumen granule cap sheet substrate.

B. After at least 24 hours drying time, inspect preparatory/flashing work for problem areas (i.e., gaps, cracks, fishmouths, air pockets, etc.) to ensure that work is complete and satisfactory. Repair any deficiencies using TOPCOAT® Flashing Grade and TOPESTER Fabric, as required.

C. Coating Application

1. Spray-apply base coat of TOPCOAT® MB Plus at a rate of 1.25 gallons per 100 sq.ft. Allow at least 24 hours drying time and inspect the base coat for defects, flaws, or holidays. Correct any unsatisfactory conditions prior to proceeding.

2. Spray-apply finish coat (same color as base coat) of TOPCOAT® MB Plus at a rate of 1.75 gallons per 100 sq.ft. Finish coat should not be applied unless the base coat is clean and dry and will provide proper adhesion. Allow at least 24 hours drying time prior to allowing foot traffic or inspection of the roof. After the 24 hours has elapsed, inspect the final roof surface for flaws, holidays, insufficient thickness, etc., and repair any unsatisfactory conditions. Specified membrane thicknesses are minimum 27 mils field and 82 mils on roof penetration details.

3. Allow at least 24 hours drying time prior to allowing foot traffic or inspection of the roof. After 24 hours has elapsed, inspect the final roof surface for flaws, holidays, insufficient thickness, etc., and repair any unsatisfactory conditions. Specified membrane thicknesses are minimum 27 mils field and 80 mils on roof penetration details.

3.4 PROTECTING ROOFING COATING

A. Upon completing roofing, including associated work, institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction will in no way affect or endanger roofing, inspect roofing and prepare a written report with copies to Architect and Owner describing nature and extent of deterioration or damage found.

B. Repair or replace, as required, deteriorated or defective work found at time of above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to requirements of specified warranty.

END OF SECTION 07521

SECTION 07 5113 - BUILT-UP ASPHALT ROOFING

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Installation of perilite / polyisocyannurate tapered insulation, slope to drains at minimum 1/4" per foot.

2. 3 ply - Modified bituminous roof with mineral granule cap sheet.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 2 Section " Demolition, Cutting and Patching".

2. Division 6 Section "Rough Carpentry" for treated wood nailers, curbs, and wood cants.

3. Division 7 Section "Flashing and Sheet Metal" for metal counter flashings.

4. Division 7 Section "Roof Specialties and Accessories" for prefabricated curb units.

1.3 DEFINITIONS

A. Thermal Resistivity (r-value) is the reciprocal of thermal conductivity (k-value) which is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivity (r-value) is expressed by the temperature difference in degrees F between two parallel surfaces required to cause 1 Btu to flow through 1 sq. ft. of a homogenous material exactly 1 inch thick per hour at the mean temperature indicated.

1.4 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specifications Sections.

B. Product data, including manufacturer's technical product information, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with requirements.

1. For asphalt bitumen, provide a label on each container or certification with each load of bulk bitumen, indicating flash point (FP), softening point (SP), and equiviscous temperature (EVT).

C. Samples of the following:

1. 12-by-12-inch square samples of each color mineral surface cap sheets to be exposed as finished roof surface.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer (Roofer) to perform built-up asphalt roofing work who has specialized in installing built-up asphalt roofing systems similar to that required for this Project and who is acceptable to manufacturer of primary roofing materials.

1. Installer's Field Supervision: Require Installer to maintain a full-time supervisor/foreman who is on job site during times that built-up asphalt roofing work is in progress and who is experienced in installing roofing systems similar to type and scope required for this Project.

B. Manufacturer Qualifications: Obtain primary products, including each type of roofing sheet (felt), bitumen, composition flashings, and any vapor retarder, from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products to use with roofing system specified.

C. UL Listing: Provide built-up roofing system and component materials that have been tested for application and slopes indicated and that are listed by UL for Class A or B external fire exposure.

1. Provide roof-covering materials bearing UL Classification Marking on bundle, package, or container indicating that materials have been produced under UL's Classification and Follow-up Service.

D. Preapplication Roofing Conference: Approximately 2 weeks prior to scheduled commencement of built-up roofing installation and associated work, meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work--including mechanical work, Architect,

Owner, roofing system manufacturer's representative, and other representatives directly concerned with work performance, including Owner's insurers, test agencies, and governing authorities, where applicable.

1. Review foreseeable methods and procedures related to roofing work, including, but not necessarily limited to, the following:

    a. Review foreseeable methods and procedures related to roofing work, including but not necessarily limited to the following:

    b. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by other trades.

    c. Review roofing system requirements (drawings, specifications, and other contract documents).

    d. Review required submittals, both completed and yet to be completed.

    e. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

    f. Review required inspection, testing, certifying, and material usage accounting procedures.

    g. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).

2. Record (Contractor) discussions of conference, including decisions and agreements or disagreements reached, and furnish a copy for each attendee. If substantial disagreements exist at the conclusion of the conference, determine how disagreements will be resolved and set a date for reconvening the conference.

1.6 PROJECT CONDITIONS

A. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed according to manufacturers' recommendations and warranty requirements.

B. Temporary Roofing: When adverse job conditions or weather conditions prevent permanent roofing and associated work from being installed according to requirements and Contractor determines that roofing cannot be delayed because of need for job progress or protection of other work, install temporary roofing. Engage roofing Installer to provide temporary roofing and to remove it prior to proceeding with permanent roofing work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store and handle roofing materials to ensure dryness. Store in a dry, well-ventilated, weather-tight place. Unless protected from weather or other moisture sources, do not leave unused felts on the roof overnight or when roofing work is not in progress. Store rolls of felt and other sheet materials on end on pallets or another raised surface. Handle and store materials or equipment in a manner to avoid significant or permanent deck deflection.

1.8 WARRANTY

A. Special Project Warranty: Submit two executed copies of standard 2-year Roofing Warranty covering work of this Section per the terms of the Supplemental Conditions of these specifications, including roofing membrane, composition flashing, roof insulation, any vapor retarders, and roofing accessories, signed and countersigned by Installer (Roofer) and Contractor.

B. Manufacturer's Warranty: Submit executed copy of roofing manufacturer's 20 year “no dollar limit” (NDL) Service Guarentee agreement, including flashing endorsement, signed by an authorized representative of built-up roofing system manufacturer, on form that was published with product literature as of date of Contract Documents.

C. Warranty Period: 20 years from date of Substantial Completion.

D. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 TAPERED INSULATION / PERILITE SUBSTRATE

A. Polyisocyannurate tapered insulation with thickness required to achieve 1/4" per foot slope to roof drains from furthest point of drain.

B. 1/2" Perilite insulation board.

1. John Mansfield Duraboard

2. or Approved equal

Note: Gypsum based underlayment will not be accepted as a substitution.

2.2 BUILT-UP ROOF MEMBRANE SYSTEM

A. Nailable-Deck, Asphalt, Glass-Fiber, Mineral Roofing (NAGM-BUR): Provide built-up asphalt roof system with glass-fiber felts and mineral-surface cap sheet as follows:

1. Sheathing Paper: Single ply of 5-lb, rosin-sized sheathing paper.

2. Base Ply: Single ply of asphalt glass-fiber felt complying with ASTM D 2178, Type IV.

3. Ply Sheets: Two plies of asphalt, glass-fiber felt, complying with ASTM D 2178, Type IV.

4. Mineral-Surface Cap Sheet: Single ply of heavyweight, glass-fiber felt with asphalt coating and factory-applied surfacing of opaque mineral granules, complying with ASTM D 3909. Provide white granules, unless otherwise indicated.

5. Available Products: Subject to compliance with requirements, built-up asphalt roofing systems that may be incorporated in the Work include, but are not limited to, the following:

a. GAF Corp.; Specification N-B-4-MEC/P6.

b. Garland Roofing Company.

c. or approved equal

2.3 BUILT-UP ASPHALT ROOFING SYSTEM EDGE/PENETRATION MATERIALS

A. Roofing Cement: Asphaltic cement, asbestos-free, complying with ASTM D 4586.

B. Glass-Fiber Fabric: Minimum 1.5-lb woven glass-fiber sheet impregnated with asphalt, complying with ASTM D 1668.

C. Preformed Edge Strips: Rigid insulation units matching roof insulation, or asphalt-impregnated organic-fiber insulation units, molded to form 3-1/2-by-3-1/2-inch by 45-degree cant strips and 1-5/8-by-18-inch tapered-edge strips to receive roofing ply-sheet courses and lift edges above main roofing surface.

2.4 REFLECTIVE "ENERGY STAR" COATING

A. GAF "TopCoat MB Plus (white)" reflective coating, or approved equal, over specified cap sheet to meet Title-24 cool roof requirements. Apply two coats of 1 1/2" gallon (3 gal. total) per square. Installation required at roof, not required at parapet walls.

2.5 SHEET METAL ACCESSORY MATERIALS

A. Coordinate below with Section 07600, "Flashing and Sheet Metal."

B. Zinc-Coated Steel: ASTM A 526, with 0.20 percent copper, G90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359 inch thick (20 gage), unless indicated otherwise.

C. Stainless Steel: ASTM A 167, AISI type 302/304, No. 2D finish, temper as required for forming and performance; 0.015 inch thick (28 gage), unless indicated otherwise.

D. Aluminum: ASTM B 209, alloy 3003, temper H 14, unless harder temper required for forming and performance, AA-C22A41 clear-anodized finish; 0.032 inch thick (20 gage), unless indicated otherwise.

E. Solder for Sheet Metal: Unless indicated otherwise or recommended by metal manufacturer, provide 50:50 tin/lead type (ASTM B 32) for tinning and soldering joints; use rosin flux.

1. Solder stainless steel joints with 60:40 tin/lead type solder.

2.6 MISCELLANEOUS MATERIALS

A. Wood Members, Units: Comply with requirements of "Rough Carpentry" Section for nailers, walkway units, and other wood members indicated as roofing system work. Provide wood pressure treated with waterborne preservatives for above-ground use (AWPB LP-2).

B. Substrate Joint Tape: 6-inch- or 8-inch-wide, coated, glass-fiber joint tape.

C. Asphaltic Primer: Comply with ASTM D 41.

D. Fasteners: Provide industry-standard types of mechanical fasteners for built-up asphalt roofing system work, tested by manufacturer for required pull-out strength where applicable and compatible with deck type and roofing products used. Provide either 1-inch-diameter nail heads or 1-3/8-inch-diameter by 30-gage sheet metal caps for nails used to secure base sheets, felts, or insulation boards of roofing system.

2.7 FABRICATING SHEET METAL ACCESSORIES

A. SMACNA and NRCA Details: Conform metal work with details shown and with applicable fabrication requirements of Architectural Sheet Metal Manual by SMACNA. Comply with installation details of NRCA Roofing and Waterproofing Manual.

B. Prefabricate units as indicated or provide standard manufactured units complying with requirements; fabricate from zinc coated sheet metal. or, if not otherwise indicated, from lead-coated copper.

C. Provide 4-inch-wide flanges set in roofing cement for applying built-up asphalt roofing system membrane concealed by composition stripping.

D. Fabricate work with flat-lock soldered joints and seams; except where joint movement is necessary, provide 1-inch-deep interlocking hooked flanges filled with mastic sealant.

E. Fabricate roof insulation vents with 4-inch-diameter stack, 12 inches high, filled with glass-fiber insulation. Equip stack with 6-inch-diameter by 3-inch-high weatherproof vent cap.

F. Fabricate gravel rings and aggregate divider strips with 1-inch-high standing leg of folded sheet metal, notched from top with 5/8-inch-deep V notches. Space notches 3 inches o.c. where strip intersects flow of water on roof, 6 inches o.c. elsewhere. Fabricate rings to sizes and shapes indicated (but not less than 36 inches square), and fabricate running strips (as shown) in maximum 4-foot lengths for butt-joint installation (with 1/4-inch gaps).

G. Fabricate penetration sleeves with minimum 8-inch-high stack of diameter 1 inch larger than penetrating element. Counterflashing is specified as work of another section of these specifications.

PART 3 - PART 3 - EXECUTION

3.1 INSPECTING SUBSTRATE

A. Demolition and remove all existing roof membrane(s) complete to existing roof substrate. Examine substrate surfaces to receive built-up roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

1. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane. Check for proper spacing between adjacent wood panels.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Cooperate with Project Inspector of Record, inspection and test agencies engaged or required to perform services in connection with installing built-up roofing system.

B. Protect other work from spillage of built-up roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace/restore other work damaged when installing built-up roofing system work.

C. Insurance/Code Compliance: Install and test, where required, built-up roofing system to comply with governing regulations and the following insurance requirements:

1. UL Fire Classified and Class 60 uplift resistance.

D. Coordinate installing roofing sheets, flashings, stripping, coatings, and surfacings so that insulation and felts are not exposed to precipitation or exposed overnight. Provide cutoffs at end of each day's work to cover exposed felts and insulation with a course of coated felt with joints and edges sealed with roofing cement. Remove cutoffs immediately before resuming work.

E. Asphalt Bitumen Heating: Heat and apply bitumen according to EVT Method as recommended by NRCA. Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT more than 1 hour prior to application. Discard bitumen that has been held at a temperature exceeding finished blowing temperature (FBT) for more than 3 hours. Determine flash point, FBT and EVT of bitumen, either by information from bitumen producer or by suitable tests. Determine maximum fire-safe handling temperature and do not exceed that temperature in heating bitumen. In no case heat bitumen to a temperature higher than 25 deg F (minus 4 deg C) below flash point. For aggregate-surfaced pour coats of bitumen, limit application temperature to minimum required for proper aggregate embedment and maximum that will permit retaining a coating of weight required (depends on slope of surface). Keep kettle lid closed except when adding bitumen.

F. Bitumen Mopping Weights: For interply mopping, and for other moppings except as otherwise indicated, apply bitumen between plies at the rate of 25 lb of asphalt per roof square (plus or minus 20 percent on a total-job average basis).

G. Substrate Joint Penetrations: Do not allow bitumen to penetrate substrate joints and enter building or damage insulation, vapor retarders, or other construction. Where mopping is applied directly to a substrate, tape joints or,

in the case of steep asphalt, hold mopping back 2 inches from both sides of each joint.

H. Cutoffs: At the end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two plies of No. 15 roofing felt set in full moppings of hot bitumen; remove at beginning of the next day's work. Glaze-coat areas of completed organic ply sheets that cannot be flood-coated and aggregate-surfaced before the end of each day's work.

3.3 ROOF MEMBRANE INSTALLATION

A. Install single ply of 5-lb, rosin-sized, sheathing paper to substrate per manufacturer’s recommended anchoring method and spacing.

B. Shingling Plies: Except as otherwise indicated, install membrane with ply sheets shingled uniformly to achieve required amount of membrane thickness throughout. Shingle in proper direction to shed water on each large area of roofing where slope is significant (over 1/2 inch per foot).

C. Nailing, General: Comply with governing regulations, insurance requirements, prime roofing manufacturer's recommendations, and recognized industry standards, but not less than one nail per 1.5 sq. ft. of built-up roofing. Where possible, nail simultaneously through two ply sheets by nailing at laps as second sheet is installed. Where nailing is to prevent slippage, nail each sheet of built-up roofing membrane. On non-nailable substrates, nail membrane to each nailer in substrate. Conceal nailing within ply-sheet makeup of roofing membrane, with no exposed nails before applying roof coatings or aggregate surfacing.

D. Cant Strips/Tapered-Edge Strips: Except as otherwise shown, install preformed 45-degree insulation cant strips at junctures of built-up asphalt roofing system membrane with vertical surface. Provide preformed, tapered-edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

E. Base Ply: Install one lapped course of base ply. Nail to nailable substrates and elsewhere as indicated. Mop to non-nailable substrate with steep asphalt, except use special adhesive where indicated.

F. Interply Sheets: Install the number and type(s) of ply sheets (felts) indicated, lapped (shingled) amount specified to form a continuous, uniform membrane with continuous bitumen moppings between sheets so that ply sheet does not touch ply sheet. As ply-sheet membrane is laid up, glaze-coat top surface with a 20-lb mopping per square of same bitumen.

1. Nail base of membrane to substrate without mopping.

2. Extend built-up roofing membrane to 8 inches (nominal) above top edge of cant strip. Shingle built-up roofing full extend of parapet interior wall and over top of wall.

3. Provide a folded-back envelope at edges and penetrations of built-up roofing membrane where it is not turned up on a tapered strip to provide positive protection against flow of bitumen into building or off the edge. Extend base sheet to form envelope or, where no base sheet is provided, install one ply of coated felt set in steep asphalt with joints sealed. Seal corners and other interruptions of envelope with large beads of roofing cement to protect against bitumen flow.

4. Nail edges of roofing membrane to wood blocking at perimeter edges of roof prior to installing metal gravel stops/fascias. Space nails at minimum 8 inches o.c.

3.4 COMPOSITION FLASHING AND STRIPPING

A. Install composition flashing at cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof. Install one ply of No. 15 asphalt-impregnated organic fabric and one ply of glass-fiber-reinforced flashing, each set in a continuous coating of roofing cement and extended onto deck 4 inches and 6 inches, respectively. Nail or provide other forms of mechanical anchorage of composition flashing to vertical surfaces as recommended by manufacturer of primary roofing materials. Except where concealed by elastic flashing, apply a heavy coating of roofing cement over composition flashing.

B. Install composition stripping where metal flanges are set on roofing. Provide not less than one ply of glass-fiber fabric and one ply of reinforced glass-fiber flashing; set each in a continuous coating of roofing cement and extended onto the deck 4 inches and 6 inches, respectively. Except where concealed by aggregate surfacing or elastic flashing, apply a heavy coating of roofing cement over composition stripping.

C. Allow for expansion of running metal flashing and edge trim that adjoins roofing.

D. Counter-Flashings: Counter-flashings, cap flashings, expansion joints, and similar work to be coordinated with built-up roofing work are specified in other sections of these specifications.

E. Roof Accessories: Miscellaneous sheet metal accessory items, including insulation vents and other devices, and any major items of roof accessories to

be coordinated with built-up roofing system work are specified in other sections of these specifications.

F. Cap Sheet Surfacing: Promptly after completion of ply-sheet membrane (same day where possible), apply one lapped course of cap sheet-type indicated. Set cap sheet in uniform mopping of same hot bitumen used in ply-sheet courses, at average rate of 15 lb per square. Lap ends 6 inches minimum.

3.5 PROTECTING ROOFING

A. Upon completing roofing, including associated work, institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction will in no way affect or endanger roofing, inspect roofing and prepare a written report with copies to Architect and Owner describing nature and extent of deterioration or damage found.

B. Repair or replace, as required, deteriorated or defective work found at time of above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to requirements of specified warranty.

END OF SECTION 07511

SECTION 07 6200 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Metal counter flashing and base flashing.
2. Metal wall flashing and expansion joints.
3. Gutters and downspouts (rain drainage).
4. Exposed metal trim/fascia units.
5. Miscellaneous sheet metal accessories.

B. Roofing accessories installed integral with roofing membrane are specified in roofing system sections as roofing work.

C. Roof accessory units of premanufactured, set-on type are specified in Division 7 Section "Roof Accessories."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

C. Samples of the following flashing, sheet metal, and accessory items:

1. 8-inch-square samples of specified sheet materials to be exposed as finished surfaces.
2. 12-inch-long samples of factory-fabricated products exposed as finished work. Provide complete with specified factory finish.

D. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counterflashings, trim/fascia units, gutters, downspouts, scuppers, and expansion joint systems. Provide layouts at 1/4-inch scale and details at 3-inch scale.

1.4 PROJECT CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM MATERIALS

A. Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A 526 except ASTM A 527 for lock-forming, G90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359-inch thick (20 gage) except as otherwise indicated.

B. Stainless Steel: AISI Type 302/304, complying with ASTM A 167, 2D annealed finish, soft, except where harder temper required for forming or performance; 0.0156-inch thick (28 gage) except as otherwise indicated.

C. Sheet Aluminum: ASTM B 209, alloy 3003, temper H14, AA-C22A41 clear anodized finish; 0.032-inch thick (20 gage) except as otherwise indicated.

D. Extruded Aluminum: Manufacturer's standard extrusions of sizes and profiles indicated, 60063-T52, AA-C22A41 clear anodized finish; 0.080-inch minimum thickness for primary legs of extrusions.

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES:

A. Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.

B. Solder: For use with stainless steel, provide 60 - 40 tin/lead solder (ASTM B 32), with acid-chloride type flux, except use rosin flux over tinned surfaces.

C. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

D. Bituminous Coating: SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

E. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non-drying, nonmigrating sealant.

F. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealers."

G. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

H. Paper Slip Sheet: 5-lb. rosin-sized building paper.

I. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

J. Gutter and Conductor-Head Guards: 20-gage bronze or nonmagnetic stainless steel mesh or fabricated units, with selvaged edges and noncorrosive fasteners. Select materials for compatibility with gutters and downspouts.

2.3 FABRICATED UNITS

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

F. Aluminum Extrusion Units: Fabricate extruded aluminum running units with formed or extruded aluminum joint covers for installation behind main members where possible. Fabricate mitered and welded corner units.

G. Shop Finish, Rain Drainage: Provide shop finish on sheet metal rain drainage units (gutters, downspouts, and similar exposed units); with primer compatible with special coating (Tnemec or approved equal), Finish coat of Special Coating (Tnemec or approved equal) may be shop or field applied.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

D. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

E. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6 inches o.c. Fabricate seams at joints between units with minimum 3-inch overlap, to form a continuous, waterproof system.

F. Install continuous gutter guards on gutters, arranged as hinged units to swing open for cleaning gutters. Install "beehive"-type strainer-guard at conductor heads, removable for cleaning downspouts.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION 07600

SECTION 07 7200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Prefabricated curb.
2. Equipment platforms.
3. Equipment support units
4. Preformed roofing accessories

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" for roof deck and nailers.
2. Division 7 Section for roofing types and roofing accessories included as part of roofing Work.
3. Division 7 Section "Flashing and Sheet Metal" for metal flashing, valleys, gutters, and downspouts.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified. Submit manufacturer's detailed technical product data, installation instructions and recommendations, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

C. Shop drawings showing fabrication and installation of each roof accessory specified including fully dimensioned plans, elevations, sections, details of components, and attachments to other units of Work. Also show layout,

anchorage details, rough-in requirements, and conditions on the roof or for other accessories.

D. Samples for verification purposes in full-size units or representative section of each type of roof accessory indicated for each color, texture, shape, and sizes specified.

E. Coordination Drawings: Submit coordination drawings for items interfacing with or supporting mechanical or electrical equipment, ductwork, piping, or conduit. Indicate dimensions and locations of items provided under this Section, together with relationships and methods of attachment to adjacent construction and to mechanical or electrical items.

1.4 QUALITY ASSURANCE

A. Standards: Comply with the following:

1. SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated.

2. NRCA "Roofing and Waterproofing Manual" details for installation of units.

3. NFPA 204M for smoke-and-heat vent design constraints, operation, and location.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Prefabricated Curb, curb adaptors and equipment support units:

a. Cannon Fabrication Inc.

b. Custom Curb, Inc.

c. Or Approved Equal.

2. Preformed accessories:

a. G.A.F Inc.

b. Firestone Inc.

c. or approved equal

2.2 MATERIALS, GENERAL

A. Aluminum Sheets: ASTM B 209 for Alclad alloy 3005H25 or alloy and temper required to suit forming operations with mill finish, unless indicated otherwise.

B. Extruded Aluminum: ASTM B 221 alloy 6063-T52 or alloy and temper required to suit structural and finish requirements. Mill finish, unless indicated otherwise.

C. Structural-Quality Galvanized Steel Sheet: ASTM A 446 with G90 coating complying with ASTM A 525, Grade C, or to suit manufacturer's standards.

D. Commercial-Quality Galvanized Steel Sheet: ASTM A 526 with G90 coating complying with ASTM A 525.

E. Galvalume-Coated Steel Sheet: ASTM A 792 with class AZ-50 coating, Grade 40, or to suit manufacturer's standards.

F. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.

G. Wood Nailers: Softwood lumber, pressure treated with water-borne preservatives for above-ground use, complying with AWPA C2; not less than 1-1/2 inch thick.

H. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.

1. Where removal of exterior exposed fasteners affords access to building, provide nonremovable fastener heads.

I. Gaskets: Manufacturer's standard tubular or fingered design of neoprene or polyvinyl chloride, or block design of sponge neoprene.

J. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.

K. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

L. Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint surfaces; ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, G, and, A.

M. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

N. Preformed T.P.O. 45 mil square tube wrap and 75 mil vent boots with stainless steel clamps.

2.3 FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations on applying and designating finishes.

B. Finish designations prefixed by AA conform to the system for designating aluminum finishes established by the Aluminum Association.

C. Class I, Clear-Anodized Finish: AA-C22A41 (Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 607.1.

D. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat thermocured system, complying with AAMA 605.2, composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene resin by weight; complying with AAMA 605.2.

1. Color and Gloss: As indicated by reference to manufacturer's standard color and sheen designations.

2.4 PREFABRICATED CURBS, CURB ADAPTORS AND EQUIPMENT SUPPORTS

A. General: Comply with loading and strength requirements as indicated where units support other work. Coordinate dimensions with rough-in information or shop drawings of equipment to be supported.

1. Fabricate of structural-quality, hot-dip galvanized or galvalume sheet steel, factory-primed and prepared for painting with welded or sealed mechanical corner joints.

2. Provide complete with cant strips and base profile coordinated with roof insulation thickness. Provide preservative-treated wood nailers at tops of curbs, coordinate with thickness of insulation and roof flashing

as indicated, tapered as necessary to compensate for roof deck slopes of 1/4 inch per foot and less.

3. Unless otherwise indicated or required for strength, fabricate units of minimum 14-gage (0.0747-inch-thick) metal, and to minimum height of 12 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, vapor barriers, roof insulation, roofing and flashing, as required, to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses, as well as inward and outward loading pressures.

1. Except as otherwise indicated, install roof accessory items according to construction details of NRCA "Roofing and Waterproofing Manual."

B. Isolation: Where metal surfaces of units are to be installed in contact with incompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.

C. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.

D. Cap Flashing: Where cap flashing is required as component of accessory, install to provide adequate waterproof overlap with roofing or roof flashing (as counterflashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

E. Operational Units: Test operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

F. Heat-and-Smoke Vents: Locate, install, and test according to NFPA 204M.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal and plastic surfaces according to manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION 07720

SECTION 07 9200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for the following locations:

1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:

a. Control and expansion joints in cast-in-place concrete.

b. Perimeter joints between materials listed above and frames of doors and windows.

c. To make building watertight.

d. To fill an exposed joint between materials which do not fit tightly together

2. Exterior joints in horizontal traffic surfaces as indicated below:

a. Control, expansion, and isolation joints in cast-in-place concrete slabs.

b. Tile control and expansion joints.

c. Joints between different materials listed above.

d. Other joints as indicated.

3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:

a. Perimeter joints of exterior openings where indicated.

b. Tile control and expansion joints.

c. For sound isolation in partitions and ceilings

d. Other joints as indicated.

4. Interior joints in horizontal traffic surfaces as indicated below:

a. Control and expansion joints in cast-in-place concrete slabs.

b. Other joints as indicated.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Flashing and Sheet Metal" for sealing joints related to flashing and sheet metal for roofing.

2. Division 8 "Glass and Glazing" for sealants used in glazing.

3. Division 9 Section "Gypsum Drywall" for sealing concealed perimeter joints of gypsum board partitions to reduce sound transmission.

4. Division 9 Section "Tile" for sealing tile joints.

1.3 REFERENCES

A. Manufacturer's recommendations and specifications.

B. ASTM C 834 - Standard Specification for Latex Sealants.

C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

D. ASTM C 1193 - Standard Guide for Use of Joint Sealants.

E. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).

F. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

B. Design Requirements

1. Sealing building envelope

a. Seal typical building joints with non-sag type sealant.

b. Seal indicated floor joints with self-leveling or slope grade self leveling type sealant.

C. Performance Requirements

1. Building envelope:

a. Make watertight and weathertight.

b. Exterior work that does not remain watertight and all work which does not retain all properties inherent in the product as stipulated by the manufacturer will be considered faulty

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data from manufacturers for each joint sealant product required.

1. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples 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.

E. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

C. Product Testing: Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.

1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.

D. Field-Constructed Mock-Ups: Prior to installation of joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution:

1. Joints in field-constructed mock-ups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants specified in this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.

2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4.4 deg C).

3. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.9 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

1.10 WARRANTY

A. See Section 01700 - Closeout Procedures, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

D. Provide manufacturer's 5 year standard material warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURES

A. Polyurethane Sealants:

1. Pecora Corporation: www.pecora.com.

2. Oegussa Building Systems/Sonneborn: www.chemrex.com.

3. Sika AG: www.sika.com.

4. Tremco, A BFGoodrich Specialty Chemicals Company

B. Acrylic Emulsion Latex Sealants:

1. OAP, www.dap.com.

2. Pecora Corporation: www.pecora.com.

3. Oegussa Building Systems/Sonneborn: www.chemrex.com.

C. Substitutions: See Section 01600 - Product Requirements.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

C. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by the more stringent of the South Coast Air Quality Management District Rule NO.1168.

2.3 GENERAL PURPOSE EXTERIOR SEALANT:

A. Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; multi-component.

1. Product:

a. "NP-2" manufactured by Sonneborn.

b. "Sikaflex 2C" manufactured by Sika.

c. Dymeric 240 FC" manufactured by Tremco

2. Applications: Use for:

a. Control, expansion, and soft joints in masonry.

b. Joints between concrete and other materials.

c. Joints between metal frames and other materials.

d. Other exterior joints for which no other sealant is indicated.

3. Color: Standard colors matching finished surfaces. Provide minimum of 40 standard selection choices, when custom color to match is noted, use Sonneborn Sealant Color Matching System. Allow for minimum

of five color selections at exterior, and five more at interior, including custom matches.

a.

B. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.

1. Product:

a. "NP-1" manufactured by Sonneborn.

b. "Sikaflex 1 A" manufactured by Sika.

c. “Dymonic FC" manufactured by Tremco.

2. Applications: Use for:

a. Joints between metal frames and other materials.

b. Other exterior joints for which no other sealant is indicated.

3. Color: Provide standard sealant color choices for seelction by architect. Allow for a minimum of five color selections total.

C. Exterior Metal Lap Joint Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A;

1. Product:

a. "NP-1" manufactured by Sonneborn. 2. Product: "Sikaflex 1A" manufactured by Sika.

b. "Dymeric 240 FC" manufactured by Tremco.

2. Applications: Use for:

a. Concealed sealant bead in sheet metal work.

b. Concealed sealant bead in siding overlaps.

D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.

1. Products

a. "Sonolac" manufactured by Sonneborn.

b. "DAP 230" by DAP.

c. "Pecora AC20" by Pecora.

2. Applications: Use for:

a. Interior wall and ceiling control joints.

b. Interior joints between door and window frames and wall surfaces.

c. Other interior joints for which no other type of sealant is indicated.

3. Color: Provide standard sealant color choices for seelction by architect. Allow for a minimum of five color selections total.

E. Tile Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.

1. Applications: Use for:

a. Joints between plumbing fixtures and floor and wall surfaces.

b. Joints between kitchen and bath countertops and wall surfaces.

F. Acoustical Sealant: Synthetic rubber, single component.

1. Product

a. Tremco "Acoustical Sealant"

G. Exterior or Interior Horizontal Expansion Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A; single component.

1. Products

a. SL-2 Slope Grade or Self Leveling Sealant" manufactured by Sonneborn.

b. "Sikaflex 2C SL" manufactured by Sika.

c. "Vulkem 245" manufactured by Tremco.

2. Applications: Use for:

a. Expansion joints in floors.

b. Joints in sidewalks and vehicular paving.

3. Color

a. Standard colors matching finished surfaces.

H. Foam Sealant:

1. Product

a. "Touch'n Seal RX" as manufactured by Convenience Products, Fenton, MO.

I. Sealer Tape:

1. Product

a. Inmont "Presstite #579.6"

b. 3M "Seam Sealer Tape"

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; 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

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. 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 with adjoining surfaces that otherwise would be permanently stained or

damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

E. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

F. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.

G. Install bond breaker where joint backing is not used.

H. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

I. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

J. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.

1. Use masking tape to protect adjacent surfaces of recessed tooled joints.

K. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

END OF SECTION 07901

SECTION 08-3113 - ACCESS DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes access doors for installation in the following types of construction:

1. Gypsum drywall.

2. Ceramic tile.

B. Provide fire-rated access doors where indicated or scheduled.

C. Provide painted steel access doors where access required at Gypsum Board or similar contruction.

D. Provide Stainless steel perforated frames and recessed faced doors to receive thin-set tile face finish at ceramic tile walls.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data in form of manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions, and directions for installation of anchorage, devices.

a. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.

2. Shop drawings showing fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.

3. Samples, 3 inches by 5 inches minimum size, of each panel face material showing factory-finished color and texture.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.

B. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.'s "Building Materials Directory" for rating shown.

1. Provide UL label on each fire-rated access door.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

D. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.5 PROJECT CONDITIONS

A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

B. Special-Size Access Doors: Use where required or requested; indicate on schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering access doors that may be incorporated in the work include, but are not limited to, the following:

1. Karp Associates, Inc.

2. Milcor, Inc.

3. Nystrom, Inc.

4. or approved Equal

2.2 MATERIALS AND FABRICATION

A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts, and ready for installation.

B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.

C. Frames: Fabricate from 16-gage steel.

1. Fabricate frame with exposed flange nominal 1-inch wide around perimeter of frame for units installed in the following construction:

a. Exposed concrete.

b. Drywall finish.

2. Fabricate frame with concealed flange frame for units installed in the following construction:

a. Ceramic Tile.

3. For gypsum drywall or gypsum veneer plaster, furnish perforated frames with drywall bead.

4. For ceramic tile, furnish perforated frames and recessed faced doors to receive thin-set tile face finish.

D. Flush Panel Doors: Fabricate from not less than 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint and Field Paint to match adjacent surface.

1. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.

E. Recessed Panel Doors: Fabricate from not less than 18-gage sheet steel with face of panel formed to provide recess below surface of applied finish. Reinforce panel as required to prevent buckling. Finish with manufacturer's factory-applied prime paint

1. Furnish recessed panels for concealed installation where access is required in ceamic tile wainscots or walls.

F. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.

1. Provide one cylinder lock per access door. Furnish 2 keys per lock. Key all locks alike, unless otherwise scheduled.

2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's instructions for installation of access doors.

B. Coordinate installation with work of other trades.

C. Where access panels are required at ceramic tile walls, coordinate location of access doors and adjacent wall grout layout so ceramic faced door grout line align with adjacent surface layout.

D. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

3.2 ADJUST AND CLEAN

A. Adjust hardware and panels after installation for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 09-0511 - PREPARATION OF CONCRETE FOR FINISH FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Mechanical cleaning of new concrete floor surfaces for application of the following finishes:

a. Sealers.

b. Coatings.

1.3 RELATED REQUIREMENTS

A. Section 01-6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01-6110 - CalGreen Design Requirements.

C. Section 03-3000 - Cast-In-Place Concrete for concrete floor slabs.

D. Section 07-2633 - Water Vapor Emission Barrier for Flooring.

E. Division 9 Sections for applied floor finishes.

1.4 REFERENCES

A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code 2012, with 2013 California Amendments.

1.5 ADMINSTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1. Review conditions affecting substrate preparation.

2. Review procedures that will be used for substrate preparation.

3. Require attendance by Water Vapor Emission Control and Finish Flooring installers to review preparation requirements of floor finish product and flooring adhesive manufacturers

1.6 SUBMITTALS

A. Product Data: For each type of mechanical cleaning equipment used on the project.

B. Informational Submittals

1. Qualification Data: For Installer performing surface preparation.

2. Field quality-control reports.

a. Submit report of observations.

b. Certify installation is complete in accordance with manufacturer's instructions.

c. Indicate supplementary instructions provided for Project specific conditions.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained in the use of the equipment and techniques required to produce the specified results.

B. Mockups: Provide field mockups to set quality standards for surface preparation execution and for preconstruction testing.

1. Provide mockup of typical surface preparation, minimum 100 sq. ft. area. Coordinate required size with requirements for preconstruction testing.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work when undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify new concrete floors have cured minimum 28 days.

B. Examine substrates, with Installer (s) present, for compliance with requirements for surface contamination, damage, and other conditions affecting performance of the Work.

C. Examine substrate to determine repairs required to restore substrate surface to be within tolerances required for floor finishes specified in other sections, prior to completing Work of this section.

D. Examine substrate to verify surfaces prepared in accordance with this section will be suitable for application of finishes specified in other sections.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance with recommendations for methods and materials required to correct conditions before proceeding with work of this section.

F. Proceed with surface preparation only after unsatisfactory conditions have been corrected. 1. Proceeding with surface preparations indicates acceptance of surfaces and conditions of substrate.

3.2 SURFACE PREPARATION EQUIPMENT

A. Mechanical Cleaning Equipment Automatic, dry shot blast type, self contained capable of recycling blast materials and collecting surface abrasions.

3.3 SURFACE PREPARATION

A. Mechanically clean concrete substrate and create surface profile in existing concrete substrate in accordance with ASTM D 4259.

1. Mechanically clean concrete substrate to remove surface and penetrating contaminates to produce a surface profile of ICRI CSP 3 minimum, and greater as required by coating manufacturer in related sections, all in accordance with ICRI Technical Bulletin No. 03732.

2. Acceptable substrate surfaces will be free of laitance, oil, grease, flooring adhesive, paint, and other surface contaminates capable of affecting bond of specified floor finishes to concrete substrate.

B. Repair surface irregularities after cleaning.

1. Fill bugholes, spalls, cracks, deteriorated joints and other surface damage exposed or created as a result of substrate cleaning operations flush with adjacent surfaces to provide sound substrate for specified floor finish.

C. Dry broom or vacuum clean concrete substrates immediately before application of specified floor finishes in accordance with ASTM D 4258 to remove loose materials on substrate surface.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following filed tests and inspections and prepare test reports:

1. Visual inspection of completed substrate preparation to verify contamination is removed.

2. Visual inspection of completed substrate preparation to verify surface profile matches ICifi profile required for specified coating or finish, using ICRI standard rubber mold for visual comparison.

3. Prepare field quality control report Clearly indicate the locations, extents, and conditions of areas where surface preparation does not conform to specified profile and cleanliness. Document observed conditions with digital photographs.

4. Repeat inspections when additional surface preparation for unsatisfactory conditions indicated in the previous field quality control report

3.5 PROTECTION

A. Protect prepared concrete substrates from contamination. Reclean substrates that are contaminated by construction operations prior to installation of specified floor finishes.

END OF SECTION

SECTION 09-2900 - GYPSUM WALLBOARD SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide gypsum drywall and accessories where shown on the drawings, as specified herein, and as needed for a complete and proper installation.

1. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of -these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

1. Product data: Within 75 calendar days after the Contractor has received the Owner's Notice to Proceed, submit: Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with , the specified requirements;

B. Mock-ups:

1. At the site, provide a mock-up gypsum wallboard panel.

a. Make the panel approximately 4'-0" square.

b. Provide one mock-up panel for each gypsum wallboard finish used on the Work.

c. The mock-ups may not be used as part of the Work.

d. Revise as necessary.

2. The mock-up panels will be used as the standard of comparison with the remainder of the work of this Section for the purpose of acceptance or rejection.

3. Completely demolish and remove mock-up from the job site upon completion and acceptance of the work of this Section.

1.4 JOB CONDITIONS

A. Areas to receive gypsum board shall be examined for defects and irregularities and no gypsum board shall be applied to defective or irregular surfaces until after suitable corrections have been made. Gypsum board shall not be installed until the building is closed in, weatherproofed, and permanent or temporary heat is available.

1.5 STANDARDS

A. All materials and installation shall be in strict accordance with manufacturer's directions and insofar as any portion is applicable, the manufacturer's printed instructions are hereby made a direct part of this specification.

B. All materials of each gypsum wallboard system shall be from the same manufacturer, i.e., gypsum wallboard, adhesive, accessories, joint compound, etc., and shall have manufacturer's recommendation for use in the system.

1.6 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

B. Gypsum board materials shall be delivered and stored in a dry, covered space and protected from moisture. Material shall be covered with plastic sheets until ready for installation.

PART 2 - PRODUCTS

2.1 GYPSUM WALLBOARD

1. General: Provide gypsum wallboard complying with ASTM Standard C 36-87 (Fed Spec SS-L-30D), in 48" widths and in such lengths as will result in a minimum of joints.

2. Regular wallboard: Provide type III, grade R, class 1, (ASTM C 36-87), 5/8" thick except as may be shown otherwise on the Drawings.

3. Fire-retardant wallboard: Provide type III, grade X, class 1, (ASTM C 36-87), 5/8" thick.

4. Hi-impact - Mold Resistant wallboard: Abuse Resistance Level 2 or better, except level 1 for indentation, (ASTM C1629) Mold resistance (ASTMD3273) ; 5/8” thick.

B. Acceptable manufacturer:

1. U.S.G. Gypsum Wallboard

2. Georgia Pacific Gypsum

3. National Gypsum Company

4. Or equal approved by architect.

2.2 METAL TRIM

A. Form from zinc-coated steel not lighter than 26 gage, complying with Fed Spec QQ- S-775, type I, class D or E.

1. Casing beads: Provide channel-shapes with an exposed wing, and with a concealed wing not less than 7/8" wide.

2. The exposed wing may be covered with paper cemented to the metal, but shall -be suitable for joint treatment.

B. Comer beads: Provide angle shapes with wings not less than 1-1/8" wide and perforated for nailing and joint treatment.

1. Edge beads for use at perimeter of ceilings: Provide angle shapes with wings not less than 3/4 " wide .

2. Provide concealed wing perforated for nailing, and exposed wing edge folded flat.

3. Exposed wing may be factory finished in white color.

2.3 JOINTING SYSTEM

A. Provide a jointing system, including reinforcing tape and compound, designed as a system to be used together and as recommended for this use by the manufacturer of the gypsum wallboard approved for use on this Work.

B. Jointing compound may be used for finishing if so recommended by its manufacturer.

2.4 FASTENING DEVICES

A. For fastening gypsum wallboard in place on metal studs and metal channels, use flat-head screws, shouldered, specially designed for use with power-driven tools, not less than 1-5/8" long, with self-tapping threads and self-drilling points.

B. For fastening gypsum wallboard in place on wood, use not less than 1-5/8" long type G bugle-head screws.

2.5 ACCESS DOORS

A. In partitions and ceilings installed under this Section, provide doors where required for access to mechanical installations and electrical installations.

B. Types:

1. see Section 8-3113 – Access Doors

2.6 TACK BOARD SUBSTRATE

A. Acceptable products:

1. FlameSpec manufucatured by Celotex Blue Ridge fiber board, subsidary of WR Meadows

2. Microe Mineral Fiber board 300 manufactured by USG.

3. Equal products of other manufacturers when approved by the Architect.

B. Provide tack board base where tackable wall surfaces are indicated. Tack board –substrate shall be 1/2" x 4' x 8'. Tape all joints. One side shall have a smooth, laminated quality surface.

1. Substrate Characteristics:

a. Thickness 1/2”

b. Flame Spread: 20, per ASTM E 84

c. Smoked Developed: 30, per ASTM E 84

d. Classification: Class A, per NFPA

2.7 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the review of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General

1. Install the gypsum wallboard in accordance with the Drawings and with the separate boards in moderate contact but not forced into place.

2. At internal and external corners, conceal the cut edges of the boards by the overlapping covered edges of the abutting boards.

3. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.

4. Ceilings: Install the gypsum wallboard to ceilings with the long dimension of the wallboard at right angles to the supporting members.

5. Wallboard may be installed with the long dimension parallel to supporting members that are spaced 16" on centers when attachment members are provided at end joints.

B. Walls and Ceilings

1. Install the gypsum wallboard to studs at right angles to the furring or framing members.

2. Make end joints, where required, over framing or furring members.

3. Attaching: Drive the specified screws with clutch-controlled power screwdrivers, spacing the screws 12" on centers at ceilings and 16" on centers at walls.

4. Where framing members are spaced 24" apart on walls space screws 12" on centers.

5. Attach double layers in accordance with the pertinent codes and the manufacturer's recommendations.

6. Attach to wood as required by governmental agencies having jurisdiction.

7. Access doors: By careful coordination with the Drawings and with the trades involved, install the specified access doors where required.

8. Anchor firmly into position, and align properly to achieve an installation flush with the finished surface.

3.3 JOINT TREATMENT

1. General: Inspect areas to be joint treated, verifying that the gypsum wallboard fits snugly against supporting framework.

2. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees for 24 hours prior to commencing the treatment, and until joint and finishing compounds have dried.

3. Apply the joint treatment and finishing compound by machine or hand tool.

4. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.

5. Embedding compounds: Apply to gypsum wallboard joints and fastener heads in a thin uniform layer.

6. Spread the compound not less than 3" wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape.

7. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin uniform coat to not less than 6” wide at joints, and feather edged.

8. Sandpaper between coats as required.

9. When thoroughly dry, sandpaper to eliminate ridges and high points.

10. Finishing compounds: After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener heads.

11. Feather the finishing compound to not less than 12" wide.

12. When thoroughly dry, sandpaper to obtain a uniformly smooth surface, taking care to not scuff the paper surface of the wallboard.

3.4 CORNER TREATMENT

A. Internal corners: Treat as specified for joints, except fold the reinforcing tape; lengthwise through the middle and fit neatly into the corner.

1. External corners: Install the specified corner bead, fitting neatly over the comer and securing with the same type fasteners used for installing the wallboard.

2. Space the fasteners approximately 6" on centers, and drive through the wallboard into the framing or furring member.

3. After the corner bead has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8" to 10" on each side of the corner.

3.5 OTHER METAL TRIM

1. General: The Drawings do not purport to show all locations and requirements for metal trim.

2. Carefully study the Drawings and the installation, and provide all metal trim normally recommended by the manufacturer of the gypsum wallboard approved for use in this Work.

3.6 WALL AND CEILING FINISH

A. At concealed areas, plenums provide a Level 1 finish; all joints and interior angles shall have tape embedded in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

B. At surfaces where moisture resistant gypsum board is to be used as a backing board for tile provide a Level 2 finish; all joints and interior angles shall have tape embedded in joint compound and one separate coat of joint compound applied over all joints, angles, fasteners heads, and accessories. surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

C. At surfaces where light textures and flat paint are scheduled provide a Level 4 finish; all joints and interior angles shall have tape embedded in joint compound and three separate coats of joint compound applied over all joints,

angles, fasteners heads, and accessories. All joint compound sha11 be smooth and free of tool marks and ridges. Prepare the surface to be coated with a primer/sealer prior to the application of final finishes. Do not use gloss or semi-gloss paint over this assembly.

D. At surfaces where gloss or semi-gloss paint or wall covering are scheduled or where severe lighting conditions occur provide a Level 5 finish; all joints and interior angles , shall have tape embedded in joint compound and three separate coats of joint compound applied over all joints, angles, fasteners heads, and accessories. A thin skim coat of joint compound, or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free from tool marks and ridges. Prepare the surface to be coated with a primer / sealer prior to the application of final finishes. Provide a smooth texture free surface for areas scheduled to receive wall covering. For areas to receive gloss or semi-gloss paint smooth walls or a light texture may be scheduled.

E. For all areas required to receive a textured finish; Submit samples to Architect for approval. Do not begin work until the wall texture sample has been approved by the Architect. Samples shall not be done on the finished walls.

3.7 WALL AND CEILING FINISH SCHEDULE

AREA	FINISH
Concealed spaces	Fire tape
Flat Painted areas	“Orange Peel” light spray
Gloss or Semi-gloss painted areas	“Orange Peel” light spray
Acoustical Tile – Non rated condition	No Finish necessary
Acoustical Tile – rated condition	Fire Tape

3.8 CLEANING UP

A. In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces.

B. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scrap, debris, and surplus material of this Section.

END OF SECTION

SECTION 09-3013 - TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Glazed wall tile.

2. Cementitious backer units.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 3 Section "Concrete Work" for monolithic slab finishes specified for tile substrates.

2. Division 7 Section "Joint Sealers" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

3. Division 9 Section "Gypsum Drywall" for cementitious backer units installed as part of gypsum wallboard systems.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.

C. Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

1. Locate precisely each joint and crack in tile substrates by measuring, record measurements on shop drawings, and coordinate them with tile joint locations, in consultation with Architect.

D. Samples for verification purposes of each item listed below, prepared on samples of size and construction indicated, products involve color and texture variations, in sets showing full range of variations expected.

1. Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on plywood or hardboard backing and grouted.

2. Full-size units of each type of trim and accessory for each color required.

3. Metal edge strips in 6-inch lengths.

E. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source for each installation area with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

D. Field-Constructed Mock-Up: Before installing tile, erect mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mock-ups on site in location and size indicated or, if not indicated, directed by Architect.

2. Demonstrate the proposed range of aesthetic effects and workmanship.

3. Obtain Architect's acceptance of mock-ups before start of final unit of Work.

4. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of Work.

a. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Ceramic Mosaic Tile:

a. Dal-Tile Corp.

b. Or approved equal

2. Dry-Set Mortars and Grouts:

a. Custom Building Products

b. Mapei Corp.

c. Or approved Equal

3. Commercial Portland Cement Grouts:

a. Custom Building Products

b. L & M Mfg. Inc.

c. Or Approved Equal

2.2 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.

1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials compling with the following requirements:

1. Match Existing Tile.

2. Provide tile trim and accessories that match color and finish of adjoining flat tile.

D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

E. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

1. Where tile is indicated for installation on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies that this type of mounting is suitable for these kinds of uses and has been successfully used on other projects.

F. All Floor tiles to have a min. Coefficient of friction of 0.6.

2.3 TILE PRODUCTS

A. Products include Ceramic Wall Tiles of the manufacturer, size, color to match existing tile, or approved aubstitute if existing can not be matched.

B. The Architect will consider substitutions that meet the specific requirements of each tile chosen for there intended purposes. See section 1300 of these specifications for time restrictions for submitting substitutions. Some products selected have a extended lead time requirements.

C. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:

1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.

2. Shapes: As follows, selected from manufacturer's standard shapes:

a. Base for Portland Cement Mortar Installations: Coved.

b. Wainscot Cap for Thinset Mortar Installations: Surface bullnose.

c. External Corners for Portland Cement Mortar Installations: Bullnose shape with a radius of at least 3/4 inch unless otherwise indicated.

d. External Corners for Thinset Installations: Surface bullnose.

e. Internal Corners: Field-butted square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.

f. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide a reduction in thickness from 1/2 inch to 1/4 inch across nominal 4 INCH dimension.

2.4 WATERPROOFING FOR THINSET TILE INSTALLATIONS

A. Latex Rubber Waterproofing: Manufacturer's standard factory-prepackaged, job-mixed, proprietary two-part formulation consisting of liquid latex rubber and powder for trowel application and glass fiber fabric reinforcing.

B. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

1. Latex Rubber Waterproofing:

a. "Laticrete 9240 Waterproof Membrane"; Laticrete International Inc.

b. or approved equal

2.5 SETTING MATERIALS

A. Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.1 and as specified below.

1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15), or polyethylene sheeting ASTM D 4397, 4.0 mils thick.

2. Reinforcing Wire Fabric: Galvanized welded wire fabric, 2 inches by 2 inches - WO.3 by WO.3 (16 ASW gage or 0.0625 inch diameter); comply with ASTM A 185 and ASTM A 82 except for minimum wire size.

3. Latex additive (water emulsion) described below, serving as replacement for part or all of gauging water, of type specifically recommended by latex additive manufacturer for use with job-mixed portland cement and aggregate mortar bed.

a. Latex Additive: Manufacturer's standard.

B. Dry-Set Portland Cement Mortar: ANSI A118.1.

C. Latex-Portland Cement Mortar: ANSI A118.4, composition as follows:

1. Latex additive (water emulsion) of type described below, serving as replacement for part or all of gauging water, combined at job site with prepackaged dry mortar mix supplied or specified by latex additive manufacturer.

a. Latex Type: Manufacturer's standard.

D. Water-Cleanable Tile-Setting Epoxy Adhesive: ANSI A118.3.

2.6 GROUTING MATERIALS

A. Commercial Portland Cement Grout: ANSI A118.6, colors to be selected by Architect from manufacturers standard colors.

2.7 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with requirements of Division 7 Section "Joint Sealers," including ASTM C 920 as referenced by Type, Grade, Class, and Uses.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.

D. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:

1. One-Part Mildew-Resistant Silicone Sealant:

a. "Dow Corning 786"; Dow Corning Corp.

b. "or approved equal

2.8 CEMENTITIOUS BACKER UNITS (GLASS MESH MORTAR UNITS)

A. Proprietary backing units with glass fiber mesh reinforcing and water-resistant coating on both faces, complying with the following requirements:

1. Cement-Coated Portland Cement Panels: High-density portland cement surface coating on both faces and lightweight concrete core composed of portland cement and expanded ceramic aggregate; fabricated in panels 7/16-inch thick by 36 inches wide by 36, 48, 60, 64, or 72 inches long and weighing 3.2 to 3.8 psf.

B. Mortar Unit Finishing Materials: Tape and joint compounds as recommended by manufacturer of cementitious backer units.

C. Available Products: Subject to compliance with requirements, cementitious backer units which may be incorporated in the Work include, but are not limited to, the following:

1. "Wonder-Board"; Modulars Inc.

2. "Durock Tile Backer Board"; Durabond Div., USG Industries, Inc.

3. or approved equal

2.9 MISCELLANEOUS MATERIALS

A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate unless otherwise indicated.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.

2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.

2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealers."

H. Grout tile to comply with the requirements of the following installation standards:

1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

I. At showers, tubs and similar wet areas, install cementitious backer units and treat joints to comply with manufacturer's instructions for type of application indicated.

3.4 WATERPROOFING FOR THINSET TILE INSTALLATIONS

A. Install waterproofing in compliance with waterproofing manufacturer's instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 WALL TILE INSTALLATION METHODS

A. Install types of tile designated for wall tile per Tile Council of North America (TCNA) Method: W244

3.6 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.

2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09300

SECTION 09-6543 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 01-4525 Testing Concrete Floor for Moisture and PH

C. Section 07-2633 Water Emmisions Control for Flooring

1.2 SUMMARY

A. This Section includes the following:

1. Homogenous (solid) Linoleum floor tile with coved base.

B. Resilient reducer strips, and other accessories installed with resilient floor tiles are specified in Division 9 Section "Resilient Wall Base and Accessories."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.

1. Certification by tile manufacturer that products supplied for tile installation comply with local regulations controlling use of volatile organic compounds (VOC's).

C. Samples for verification purposes in full-size tiles of each different color and pattern of resilient floor sheet or tile specified, showing full range of variations expected in these characteristics.

D. Product certificates, in lieu of laboratory test reports when permitted by Architect, signed by manufacturer certifying that each product complies with requirements.

E. Maintenance data for resilient floor sheet goods and tile, to include in Operating and Maintenance Manual specified in Division 1.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Floor sheet goods and Tile: Obtain each type, color, and pattern of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Fire Performance Characteristics: Provide resilient floor tile with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.

2. Smoke Density: Less than 450 per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver tiles and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C).

C. Store tiles on flat surfaces. Move tiles and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.6 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive sheet goods or tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).

B. Do not install shet good or tiles until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during tile installation.

1.7 SEQUENCING AND SCHEDULING

A. Install tiles and accessories after other finishing operations, including painting, have been completed.

B. Do not install tiles over concrete slabs until the slabs have cured and are

sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

1.8 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

1. Furnish not less than 10% of sheet goods for each type specified.

2. Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern and size of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Forbo Industries, Inc. (Basis of Design Standard)

2. or approved equal, see Section 01-6100 for Product Substitution

2.2 RESILIENT FLOORING

A. General: All resilient flooring to have a minimum Coefficient of friction of no less than 0.5.

B. Resilient Sheet Flooring:

1. Where sheet goods are indicated on the finish schedule product Shall be Forbo Marmoleum “Dual”, "Real,", “Vivace,", or equal product of Comparable quality, utility , and appearance, and as approved by the Architect. Vinyl flooring shall be 2.5mm thick x 2 meters (79") wide. Design elements shall extend throughout the thickness of the wear layer.

a. Flammability Class I in accordance with test procedure ASTM E-648 /NFP A 253

b. Less than 450 in Flaming Mode as per AS1M E-662/NFP A 258.

c. Residual Indentation: Static load limit 150 psi.

d. Patterns shall be as selected by the Architect from manufacturer's full range.

2.3 INSTALLATION ACCESSORIES

A. Fluid-applied water vapor retarder necessary to achieve slab moisture content required by flooring manufacturer and product recommnended by manufacturer.

B. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

C. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.

D. Adhesives (Cements): Water-resistant type recommended by tile manufacturer to suit resilient floor tile products and substrate conditions indicated.

E. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine areas where installation of resilient flooring will occur, with Installer present, to verify that substrates and conditions are satisfactory for tile installation and comply with tile manufacturer's requirements and those specified in this Section.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.

2. Finishes of subfloors comply with tolerances and other requirements specified in Division 3 Section "Cast-In-Place Concrete" for slabs

receiving resilient flooring.

3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile or sheet goods

B. Use trowelable leveling and patching compounds per tile manufacturer's directions to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

D. Broom or vacuum clean substrates to be covered by tiles immediately before tile installation. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

E. Apply concrete slab water sealer or primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.3 TESTING FOR MOISTURE

A. See procedures in Section 01-4523.

3.4 INSTALLATION- SHEET LINOLEUM

A. General: Comply with sheet linoleum manufacturer's installation directions and other requirements indicated that are applicable to each type of installation specified.

B. Cut required length of linoleum flooring from roll, allow enough material to extend up the wall, or beyond intended area, 4 to 6 inches at either end. Layout and position seams so they fall at least 6 inches from underlayment joints or saw cuts in concrete substrate. Apply adhesive and lay sheet flooring into wet adhesive and roll with a 100 pound roller. Install sheet square with room axis.

C. Adhesive, Sewamless flooring installation: Rout out seams and heat weld together with complementary colored heat rod of complimentary composition in accordance with resilient flooring manufacturer's recommendations.

D. Adhesive flooring and flash coved base installation. Extend flooring up the wall in a flash-coved method to a height of 6 inches. Heat weld mitred corners.

E. Adhesive Material Installation Use trowel as recommended by flooring Manufacturer for specific adhesive. Spread adhesive at a rate as specified by the flooring manufacturer with recommended trowel notching, adhesive mixing and adhesive open working time.

F. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering of joints, telegraphing of adhesive spreader marks or other surface imperfections in completed installation.

G. Where demountable partitions and other items are indicated for installing on top of finished floor, install sheet linoleum before these items are installed.

H. Scribe, cut, and fit sheets to butt tightly to vertical surfaces, permanent fixtures, built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing tile installation:

1. Remove visible adhesive and other surface blemishes using cleaner recommended by tile manufacturers.

2. Sweep or vacuum floor thoroughly.

3. Do not wash floor until after time period recommended by resilient floor tile manufacturer.

4. Damp-mop tile to remove black marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by tile manufacturer.

1. Apply protective floor polish or coating to tile surfaces that are free from soil, visible adhesive, and surface blemishes recommended by

the manufacturer.

a. Coordinate manufacturers recommended product with Owner's maintenance service.

2. Do not move heavy and sharp objects directly over tiles. Place plywood or hardboard panels over tiles and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean tiles not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean tiles using method recommended by manufacturer.

1. Reapply floor polish after cleaning.

END OF SECTION

SECTION 09-9000 - PAINTING

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.

B. See Section **09-9600 Speacial Coatings** for exterior ferrous metal and metal roofing coating.

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

1. Painting includes field-painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Prefinished items not to be painted include the following factory-finished components:

a. Metal toilet enclosures.

b. Acoustic materials, (except ceiling or wall tiles specified to be refinished)

c. Architectural woodwork and casework.

d. Light fixtures.

e. Switchgear.

f. Distribution cabinets.

2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

a. Foundation spaces.

b. Furred areas.

c. Pipe spaces.

d. Duct shafts.

3. Finished metal surfaces not to be painted include:

a. Anodized aluminum.

b. Stainless steel.

c. Chromium plate.

d. Copper.

e. Bronze.

f. Brass.

4. Operating parts not to be painted include moving parts of operating equipment, such as the following:

a. Valve and damper operators.

b. Linkages.

c. Sensing devices.

d. Motor and fan shafts.

5. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 5 Section "Structural Steel" for shop-priming structural steel.

2. Division 5 Section "Metal Fabrications" for shop-priming ferrous metal.

3. Division 6 Section "Interior Architectural Woodwork" for shop-priming interior architectural woodwork.

4. Division 9 Section "Special Coatings" for special coatings to be applied to all Exterior Ferrous Metal.

5. Division 9 Section "Exterior Wood Stains" for exterior wood stains.

6. Division 9 Section "Wall Coverings" for substrate sealer under wall coverings.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each paint system specified, including block fillers and primers.

1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.

2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

C. Samples for initial color selection in the form of manufacturer's color charts.

1. After color selection, the Architect will furnish color chips for surfaces to be coated.

D. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.

1. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

2. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.

3. Submit samples on the following substrates for the Architect's review of color and texture only:

a. Concrete: Provide two 4-inch-square samples for each color and finish.

b. Painted Wood: Provide two 12-inch-square samples of each color and material on hardboard.

c. Stained or Natural Wood: Provide two 4-by-8-inch samples of natural and stained wood finish on actual wood surfaces.

d. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

C. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color, and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.

2. Product description (generic classification or binder type).

3. Manufacturer's stock number and date of manufacture.

4. Contents by volume, for pigment and vehicle constituents.

5. Thinning instructions.

6. Application instructions.

7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

B. EXTERIOR AND INTERIOR PAINT:

1. Benjamin Moore and Co. (Moore).

2. Dunn Edwards

3. or approved equal.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide color selections made by the Architect from the manufacturer's full range of standard colors.

2.3 PRIMERS

A. Primers: Provide the manufacturer's recommended factory-formulated primers that are compatible with the substrate and finish coats indicated.

B. Available Products: Subject to compliance with requirements, prime coat materials that may be incorporated in the Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following:

1. Exterior Primer Coating: Exterior, alkyd wood primer.

a. Moore: Moorwhite Primer #100.

b. PPG: Not Required.

c. P & L: Permalize Exterior Primer.

2. Concrete and Masonry Primers: Interior, flat, latex-based paint.

a. Moore: Moore's Latex Quick-Dry Prime Seal #201.

b. P & L: Vapex Latex Flat Wall Finish.

3. New Plaster Primers: Interior, flat, latex-based paint.

a. Moore: Moore's Latex Quick-Dry Prime Seal #201.

b. P & L: Vapex Latex Flat Wall Finish.

4. Gypsum Drywall Primer: White, interior, latex-based primer.

a. Moore: Moore's Latex Quick-Dry Prime Seal #201.

b. P & L: Latex Wall Primer Z30001.

5. Exterior Primer Coating: Exterior, alkyd wood primer.

a. Moore: Moorwhite Primer #100.

b. P & L: Permalize Exterior Primer.

6. Ferrous Metal Primers: Synthetic, quick-drying, rust-inhibiting primers.

a. Moore: IronClad Retardo Rust-Inhibitive Paint #163.

b. P & L: Effecto Rust-Inhibiting Primer.

2.4 UNDERCOAT MATERIALS

A. Undercoat Materials: Provide the manufacturer's recommended factory-formulated undercoat materials that are compatible with the substrate and finish coats indicated.

B. Available Products: Subject to compliance with requirements, undercoat materials that may be incorporated in the Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following:

1. Interior Enamel Undercoat: Ready-mixed enamel.

a. Moore: Moore's Alkyd Enamel Underbody #217.

b. P & L: Interior Trim Primer.

c. Or approved equal

2.5 EXTERIOR FINISH PAINT MATERIAL

A. Available Products: Subject to compliance with requirements, finish coat materials that may be incorporated in the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:

1. Exterior, Polyvinyl Acetate Emulsion: Quick-drying, flat, polyvinyl acetate (PVA) paint.

a. Moore: Moore's Flat Exterior Latex Masonry & House Paint #105.

b. P & L: Pro-Hide Plus Interior/Exterior Vinyl-Acrylic Flat Paint Z3400 Series.

c. Or approved Equal

2. Deep-Color, Exterior Alkyd Resin Trim Paint: Deep-color, ready-mixed alkyd paint.

a. Moore: Moore's House Paint #110.

b. P & L: Effecto Enamel.

c. Or approved equal.

2.6 INTERIOR FINISH PAINT MATERIAL

A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

B. Available Products: Subject to compliance with requirements, finish coat materials that may be incorporated in the Work include, but are not limited to, the following:

1. Interior, Flat, Odorless, Alkyd Paint: Ready-mixed, interior, flat, low-odor, alkyd enamel.

a. Moore: Moore's Alkyd Sani-Flat #204.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected.

2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.

2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or

sealers have been used to improve curing, use mechanical methods of surface preparation.

a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.

b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

b. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

c. When transparent finish is required, backprime with spar varnish.

d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.

e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

4. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

a. Blast steel surfaces clean as recommended by the paint system manufacturer and according to requirements of SSPC specification SSPC-SP 10.

b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.

2. Provide finish coats that are compatible with primers used.

3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.

4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color,

and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.

8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

9. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.

10. Sand lightly between each succeeding enamel or varnish coat.

11. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

1. Brushes: Use brushes best suited for the material applied.

2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces.

G. Mechanical items to be painted include, but are not limited to, the following:

1. Piping, pipe hangers, and supports.

2. Heat exchangers.

3. Tanks.

4. Ductwork.

5. Insulation.

6. Supports.

7. Motors and mechanical equipment.

8. Accessory items.

H. Electrical items to be painted include, but are not limited to, the following:

1. Conduit and fittings.

I. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

J. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

K. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surface imperfections.

L. Pigmented (Opaque) Finishes: Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

M. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

N. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.

2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:

a. Quantitative materials analysis.

b. Abrasion resistance.

c. Dry opacity.

d. Color retention.

e. Alkali and mildew resistance.

3. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted

surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 EXTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates indicated.

B. Concrete, Stucco, and Masonry (other than concrete masonry units):

1. Lusterless (Flat) Acrylic Finish: Two coats with total dry film thickness not less than 2.5 mils.

a. First and Second Coats: Exterior acrylic emulsion.

1) Moore: Moore's Flat Exterior Latex Masonry & House Paint #105.

2) P & L: Vapex Latex Flat House Paint.

3) Or approved equal

C. Wood Trim:

1. Deep-Color, High-Gloss Alkyd Finish: Two finish coats over primer.

a. Primer: Exterior primer coating.

1) Moore: Moorwhite Deep Color Base #100-04.

2) P & L: Permalize Exterior Primer.

b. First and Second Coats: Deep-color, exterior, alkyd resin trim paint.

1) Moore: Moore's House Paint #110.

2) P & L: Effecto Enamel.

3) Or approved equal

D. Ferrous Metal: **(See section 09960 for exterior ferrous metal).**

3.8 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates, as indicated.

B. Concrete and Masonry (other than concrete masonry units):

1. Lusterless (Flat) Latex Finish: Two coats.

a. First and Second Coats: Interior, flat, latex-based paint.

1) Moore: Regal Wall Satin #215.

2) P & L: Vapex Latex Flat Wall Finish.

3) Or approved equal

C. Gypsum Drywall Systems:

1. Lusterless (Flat) Emulsion Finish: Two coats.

a. Primer: White, interior, latex-based primer.

1) Moore: Moore's Latex Quick-Dry Prime Seal #201.

2) P & L: Latex Wall Primer Z30001.

3) Or approved equal

b. Finish Coat: Interior, flat, latex-based paint.

1) Moore: Regal Wall Satin #215.

2) P & L: Vapex Latex Flat Wall Finish.

3) Or approved equal

2. Odorless Semigloss Alkyd Enamel Finish: Three coats with total dry film thickness not less than 2.5 mils.

a. Primer: White, interior, latex-based primer.

1) Moore: Moore's Latex Quick-Dry Prime Seal #201.

2) P & L: Latex Wall Primer Z30001.

3) Or approved equal

b. First and Second Coats: Interior, semigloss, odorless, alkyd enamel.

1) Moore: Moore's Satin Impervo Enamel #235.

2) P & L: Cellu-Tone Alkyd Satin Enamel.

3) Or approved equal

D. Woodwork and Hardboard:

1. Semigloss Enamel Finish: Three coats.

a. Undercoat: Interior enamel undercoat.

1) Moore: Moore's Alkyd Enamel Underbody #217.

2) P & L: Interior Trim Primer.

3) Or approved equal

b. First and Second Coats: Interior, semigloss, odorless, alkyd enamel.

1) Moore: Moore's Satin Impervo Enamel #235.

2) P & L: Cellu-Tone Alkyd Satin Enamel.

3) Or approved equal.

E. Ferrous Metal: **(see Section 09 9600 Special Coatings for coating for metal roof)**

1. Semigloss Enamel Finish: Two coats over primer with total dry film thickness not less than 2.5 mils.

   a. Primer: Synthetic, quick-drying, rust-inhibiting primer.

      1) Moore: Ironclad Retardo Rust-Inhibitive Paint #163.

      2) P & L: Effecto Rust-Inhibiting Primer.

      3) Or approved equal.

   b. Undercoat: Interior enamel undercoat.

      1) Moore: Moore's Alkyd Enamel Underbody #217.

      2) P & L: Interior Trim Primer.

      3) Or approved equal

   c. Finish Coat: Interior, semigloss, odorless, alkyd enamel.

      1) Moore: Moore's Satin Impervo Enamel #235.

      2) P & L: Cellu-Tone Alkyd Satin Enamel.

      3) Or approved Equal

END OF SECTION

SECTION 09-9600-COATING SYSTEMS FOR STEEL

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.

B. See Section 09 9000 Painting for interior non-ferrous metal

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed exterior ferrous metal items and surfaces .

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

1.3 REFERENCES

A. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.

B. SSPC-SP 1 - Solvent Cleaning.

C. SSPC-SP 2 - Hand Tool Cleaning.

D. SSPC-SP 3 - Power Tool Cleaning.

E. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.

1.4 DEFINITIONS

A. Definitions of Painting Terms: ASTM D 16, unless otherwise specified.

B. Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch).

1.5 SUBMITTALS

A. Comply with Section 01330 - Submittal Procedures.

B. Product Data: Submit manufacturer's product data for each coating, including generic description, complete technical data, surface preparation, and

application instructions.

C. Color Samples: Submit manufacturer's color samples showing full range of standard colors.

D. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.

E. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Specialize in manufacture of coatings with a minimum of 10 years successful experience.

2. Able to demonstrate successful performance on comparable projects.

3. Single Source Responsibility: Coatings and coating application accessories shall be products of a single manufacturer.

B. Applicator's Qualifications:

1. Experienced in application of specified coatings for a minimum of 5 years on projects of similar size and complexity to this Work.

2. Applicator's Personnel: Employ persons trained for application of specified coatings.

C. Preapplication Meeting: Convene a preapplication meeting 3 weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Architect, applicator, and manufacturer's representative. Review the following:

1. Environmental requirements.

2. Protection of surfaces not scheduled to be coated.

3. Surface preparation.

4. Application.

5. Repair.

6. Field quality control.

7. Cleaning.

8. Protection of coating systems.

9. One-year inspection.

10. Coordination with other work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:

1. Coating or material name.

2. Manufacturer.

3. Color name and number.

4. Batch or lot number.

5. Date of manufacture.

6. Mixing and thinning instructions.

B. Storage:

1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.

2. Keep containers sealed until ready for use.

3. Do not use materials beyond manufacturer’s shelf life limits.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Weather:

1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer’s instructions.

2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.

3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.

4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.

5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.

B. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.

C. Dust and Contaminants:

1. Schedule coating work to avoid excessive dust and airborne contaminants.

2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Tnemec Company Incorporated, (800) 863-6321 (design standard)

2. or approved Equal

B. Product described are for Tnemec Company Incorporated product is to establish product requirements and standards to meet if submitting product substitutions.

2.2 COATING SYSTEMS FOR EXTERIOR STEEL

A. Standing Seam Roof Panels and components

1. System: Metal Roof - Fluoropolymer Finish

2. Surface Preparation: SSPC-SP7/NACE No. 4 Brush-Off Blast Cleaning, 1.0 mils profile

3. Primer: Chembuild Series 135-Color; 2.0 to 3.0 mils DFT.

4. Finish: Fluoronar Series V107X-Color; 2.0 to 3.0 mils DFT

5. Total: DFT: 4.0 to 6.0 mils.

6. Finish Color: As selected by Architect from manufacturer's standard colors.

B. Grilles, louvers, roof top accessories, and miscellaneous exposed steel:

1. System Type: Acrylic Coating System.

2. Surface Preparation: SSPC-SP1 Solvent Clean both before and after mechanically cleaning all surfaces by whatever means practical to roughen the surfaces. All surfaces shall be clean, dry and uniformly roughened to exhibit an anchor profile..

3. Primer / Tie Coat: Series 115 | Uni-Bond DF-Color; 2.0 to 4.0 mils DFT.

4. Field Finish Coat: Series 1029 | Enduratone-Color; 2.0 to 3.0 mils DF

5. Total DFT: 4.0 to 7.0 mils.

6. Finish Color: As selected by Architect from manufacturer's standard colors.

C. Steel Columns, Exterior Beams, Outriggers and Rain Water Leaders.

1. System Type: Aliphatic Acrylic Polyurethane.

2. Surface Preparation: SSPC-SP1 Solvent Clean both before and after mechanically cleaning all surfaces per SSPC-SP3 Power Tool Clean. All surfaces shall be clean, dry and uniformly roughened to exhibit an anchor profile.

3. Primer Tie-coat: Series 27WB | Typoxy-Color; 4.0 to 6.0 mils DFT.

4. Field Finish Coat: Series 1095 | Endura-Shield-Color; 3.0 to 5.0 mils DFT.

5. Total DFT: 7.0 to 11.0 mils.

6. Finish Color: As selected by Architect from manufacturer's standard colors.

2.3 ACCESSORIES

A. Coating Application Accessories:

B. Accessories required for application of specified coatings in accordance with manufacturer's instructions, including thinners.

C. Products of coating manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which coating systems are to be applied. Notify Architect of areas or conditions not acceptable. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected.

3.2 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

A. A. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.

B. B. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

3.3 SURFACE PREPARATION OF STEEL

A. Prepare steel surfaces in accordance with manufacturer's instructions.

B. Fabrication Defects:

1. Correct steel and fabrication defects revealed by surface preparation.

2. Remove weld spatter and slag.

3. Round sharp edges and corners of welds to a smooth contour.

4. Smooth weld undercuts and recesses.

5. Grind down porous welds to pinhole-free metal.

6. Remove weld flux from surface.

C. Ensure surfaces are dry.

D. Exterior Steel Surfaces: Remove visible oil, grease, dirt, dust, mill scale, rust,

paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 6/NACE 3.

3.4 SURFACE PREPARATION OF GALVANIZED STEEL AND NONFERROUS METAL

A. Prepare galvanized steel and nonferrous metal surfaces in accordance with manufacturer's instructions. Surface preparation recommendations will vary depending on substrate and exposure conditions. Consult with Manufacture's Technical Services for recommendations.

3.5 APPLICATION

A. Apply coatings in accordance with manufacturer's instructions.

B. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.

C. Keep containers closed when not in use to avoid contamination.

D. Do not use mixed coatings beyond pot life limits.

E. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.

F. Uniformly apply coatings at spreading rate required to achieve specified DFT.

G. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.

H. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer.

3.6 REPAIR

A. Materials and Surfaces Not Scheduled To Be Coated: Repair or replace damaged materials and surfaces not scheduled to be coated.

B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.

C. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.7 FIELD QUALITY CONTROL

A. Inspector's Services:

1. Verify coatings and other materials are as specified.

2. Verify surface preparation and application are as specified.

3. Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges.

4. Coating Defects: Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.

a. Check for holidays on interior steel immersion surfaces using holiday detector.

5. Report:

a. Submit written reports describing inspections made and actions taken to correct nonconforming work.

b. Report nonconforming work not corrected.

c. Submit copies of report to Architect and Contractor.

B. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

3.8 CLEANING

A. Remove temporary coverings and protection of surrounding areas and surfaces.

3.9 PROTECTION OF COATING SYSTEMS

A. Protect surfaces of coating systems from damage during construction.

END OF SECTION

SECTION 10-1400 - SIGNS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide identifying devices where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Building identification
2. Room identification
3. Door signs.
4. Accessible directional
5. Accessible restroom
6. Accessible parking stall signs

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data: Within 75 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;

3. Details of installation and anchorage sufficient to enable proper interface of the work of this Section with the work of other trades.

4. Samples of manufacturer's full range of standard color options.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

PART 2 - PRODUCTS

2.1 MANUFACTUER

A. Advance Corporation / Braille-Tac Division; Product Braille-TacEtched Magnesium (Chemsast): 8200 - 97th Street South, Cottage Grove, Minnesota 55016: Telephone 800-328-9451; www.advancecorp.com/brailletac

B. or approved equal by architect.

1. See section 01630 for product substitutions.

2.2 MATERIALS

A. Plaque Signs: One piece magnesium metal construction with raised copy and braille and thermal-set, polyurethane finish.

1. Exterior durability rating: 3 years minimum.

2. Painted Finish:

a. Weatherability: When tested in acordance with ASTM G 53, after 500 hours in a Weatherometer (equivilent to 3 years of exterior exposure) gloss retention of not less than 88.0 determined in accordance with ASTM D 523 as a 60 degree angle .

b. Color Fade Resistance: Color shall not change more than 1.68 units determined in accordance with ASTM D 2244 and measured with a Hunter colormeter, Model D25.

c. Durability: Sign finish shall show no effect after requested use of cleaners such as Graffiti Remover #1120 manufactured by Fine Organics Corp., Lodi, NJ.

3. Colors: Custom, as selected by Architect.

4. Characer Font As Indicated.

5. Total Thickness: 0.153 inches.

6. Edges: Eased Square.

B. All signage shall comply with all current local, state, and federal codes and ordinances, including but not limited to: California Title-24 and the Federal Americans with Disabilities Act.

C. All permanent signs shall have contracted both California Grade 2 Braille messages and raised letters. Dots shall be 1/10 inch (2.25 mm) on centers in each cell with 2/10 inch. (5.08mm) space between cells. Dots shall be raised a minimum of 1/40 (.025) inch (0.635 mm) above background. Letters shall be raised 1/32 inch (0.794 mm). Engraved letters will not be acceptable. Letters shall have sans-serif uppercase characters.

D. Visual characters can be serif or sans serif and upper and lower case characters may be used for visual characters. Letter style shall be Helvetica medium unless otherwise noted on drawings or schedule. Minimum size shall be 5/8" (15.9 mm) and maximum size shall be 2" (51 mm). Characters on signs shall have a width to height ratio between 3:5 and 1:1 and a stroke width to height ratio of 1:5 to 1:10.

E. All signs shall have raised letters and Braille, as mentioned in Paragraph B above, in contrasting colors and a solid background. Sizes and form shall. be as indicated on the Drawmgs. Background matenal shall be 1/4 acrylIc plastic with an mtegral permanent color. Color as selected by the Architect. Signs shall be installed on the wall adjacent to the latch outside of the door. Where there is no wall space on the I latch side, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 inches above the finished floor to the centerline of the sign. Mounting locations shall be determined so that a person may, approach within 3 inches of the sign without encountering protruding objects or standing within the swing of the door.

F. Signs shall be secured in place with pressure sensitive adhesive and vandal proof screws, one at each corner of the sign, minimum of 4 screws per sign.

G. Signs adhered to glass are to have a corresponding opaque vinyl decal that matches the sign in shape and field color to be applied to opposide side of glass then the sign. Adhesive method shall bond sign to glass to prevent removal.

H. In addition to the permanent signage required above, provide signs at restroom doors accessible to the physically disabled in the shape and size required by California Title 24 of CCR and as follows.

1. Doorways leading to men's sanitary facilities, shall be identified by an equilateral triangle 1/4 inch thick with edges 12 inches long and a vertex pointing upward. Women ' s sanitary facilities shall be identified by a circle, 1 /4 inch thick and 12 inches in diameter. Unisex sanitary facilities shall be identified by a circle, 1/4 inch thick, 12 inches in diameter with a 1/4 inch thick triangle superimposed on the circle and within the 12 inch diameter. These geometric symbols shall be centered on the door at a height of 60 inches and their color and contrast shall be distinctly different from the color and contrast of the door.

2.3 ACCESSIBILITY SYMBOLS

A. Where called for accessibility symbol shall be the International Symbol of Accessibility The symbol shall be a white figure on a blue background.

B. Install International Symbol of Accessibility at building entrances and additional directional signs as indicated.

C. Occupancy signs posting maximum occupancy , if required, shall be in compliance with the State Fire Marshal and the local fire authority and shall be located in a conspicuous location near entry and exit locations.

2.4 SIGN SCHEDULE

A. Refer to the schedule on drawings for location type and text.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be - performed. Correct conditions detrimental to timely and proper completion of the

B. Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturers' recommendations, using only the approved mounting materials, and locating all components firmly into position, level and plumb.

END OF SECTION

SECTION 22-0000 - GENERAL PLUMBING REQUIREMENTS

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.

B. Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation. This Section is provided to assist Contractor in coordination of work scope but shall not be construed to limit Contractor's scope of work encompassed by the contract documents.

C. Related work specified elsewhere:

1. Utilities five feet beyond building line unless noted otherwise.

2. Structural steel (except as specified herein). Support of plumbing materials and equipment.

3. Painting (except as specifically indicated).

4. Sleeves, inserts and plumbing equipment installed under other Sections.

1.2 SUMMARY

A. Work included: Materials, equipment, fabrication, installation, starting, testing and commissioning in conformance with applicable codes and authorities having jurisdiction for Plumbing Work covered by all sections within this Division including, but not limited to:

1. Plumbing.

2. Sealants and firestopping.

1.3 REFERENCE STANDARDS

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.

B. Work shall be performed in accordance with all applicable requirements of the latest edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not

C. Requirements of Regulatory Agencies:

1. In accordance with the requirement of Division 1 - General Requirements.

2. Nothing in contract documents shall be construed to permit work not conforming to current and applicable laws, ordinances, rules and regulations.

3. When contract documents exceed requirements of applicable laws, ordinances, rules and regulations, comply with documents establishing the more stringent requirement.

4. It is not the intent of contract documents to repeat requirements of codes except where necessary for completeness or clarity.

5. Seismic construction and restraints: In accordance with requirements of CBC 2013 and ASCE 7-10.

6. Comply with the Safety Orders issued by California Occupational Safety and Health Act, COSHA and any other safety, health or environmental regulations of the State of California and any districts having jurisdictional authority. Where an omission or conflict appears between COSHA requirements and the Drawings and Specifications, COSHA requirements shall take precedence.

7. Applicable codes and standards as listed below, in addition to others specified in individual sections:

a. CEC - California Electrical Code - 2013.

b. CBC - California Building Code - 2013.

c. CMC - California Mechanical Code - 2013.

d. CPC - California Plumbing Code - 2013.

e. CALGreen - California Green Code - 2013.

f. California Code of Regulations, including Titles 8, 17, 19, 20, 21, 22 and the California Building Standards Code Part 2, Basic Building Regulations.

g. CHPS (Collaborative for High Performance Schools).

D. Published specifications, standards, tests or recommended method of trade, industry or governmental organizations as listed below apply to all work in Divisions 22, in addition to other standards which may be specified in individual sections.

E. All base material shall meet ASTM and ANSI standards.

F. All Gas Fired Devices: Comply with standards and bear label of AGA.

G. All Pressure Vessels, Relief Valves, Safety Relief Valves and Safety Valves: Comply with standards, ASME stamped.

H. All Electrical Devices and Wiring.

1. Conform to standards of CEC/NEC.

2. All devices UL or EU listed and identified.

I. Guidelines and Standards: The latest edition of guidelines and standards published by the following groups will govern the Plumbing Systems and associated support system design. The systems shall be designed to meet or exceed these guidelines and standards.

1. AABC - Associated Air Balance Council

2. ADC - Air Diffuser Balance Council

3. AGA - American Gas Association

4. AMCA - Air Movement and Control Association, Inc.

5. 5. ANSI - American National Standards Institute

6. ARI - Air Conditioning and Refrigeration Institute

7. ASC - Adhesive and Sealant Council

8. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers

9. ASME - American Society of Mechanical Engineers

10. ASTM - American Society for Testing and Materials

11. AWWA - American Water Works Association

12. AWS - American Welding Society

13. COSHA - California Occupational Safety and Health Act

14. ETL - Intertek Semko (Formerly Electrical Testing Laboratories)

15. GISO - General Industry Safety Orders

16. HI - Hydraulic Institute

17. IEEE - Institute of Electrical and Electronic Engineers

18. NBS - National Bureau of Standards

19. NEBB - National Environmental Balancing Bureau

20. NEMA - National Electrical Manufacturer's Association

21. NFPA - National Fire Protection Association

22. OSHPD - Office of Statewide Health Planning and Development

23. SFA - California State and Local Fire Marshall

24. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.

25. UL - Underwriters' Laboratories, Inc.

1.4 QUALITY ASSURANCE

A. Supply all equipment and accessories in compliance with the applicable standards listed and with all applicable national, state and local codes.

B. All equipment and accessories shall be new and the product of a manufacturer regularly engaged in its manufacture.

C. All items of a given type shall be the products of same manufacturer.

D. Conform to DSA Bulletin BU-09-10 regarding installation of "LEAD FREE" plumbing fixtures, fittings and piping.

1.5 PRODUCT SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

1. Product data: Within 75 calendar days after the Contractor has received the Owner's Notice to Proceed, submit: Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

B. No work may begin on any part of this Project until the related submittals have been reviewed for conformity with the design intent and the Contractor has responded to all comments to the satisfaction of the Owner's Representative.

C. Submit drawings, product data, samples and certificates of compliance required as hereinafter specified. See also Division I for additional requirements.

D. Submit Product Data and material safety data sheets (MSDSs) for adhesives and sealants used on the interior of the building indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA method 24).

1.6 SHOP DRAWINGS

A. Prepare and submit Shop Drawings for all Work, Minimum 1/4" per foot scale. Clearly indicate any proposed deviations from contract documents.

1. Shop fabrication, coordination and installation drawings by the Contractor, are for the Contractor's use and shall be the Contractor's responsibility. These Drawings indicate where the Contractor intends to install the material and equipment as required by the Contract Documents.

a. Contractor's reliance of contract documents or electronic files of contract documents for shop drawings is not acceptable.

B. Layout drawings, as a requirement of Division 22, shall indicate superimposed Work of all Sections involved including ductwork, piping, electrical work, ceiling work, etc. Include all mechanical rooms.

1. Individual coordinated trade layout drawings are to be prepared for all deviations from design documents.

C. Contractor is to assure that each trade has coordinated work with other trades, prior to submittal.

1. Identify any coordination or trade conflicts with proposed resolution.

a. Include stamp on each submittal indicating that layout shop drawing has been coordinated.

b. No layout shop drawing will be reviewed without stamped and signed coordinated assurance by Contractor.

2. All changes shall be clearly marked on each submitted layout drawing.

D. Review is not intended to verify dimensions or quantities, or to coordinate items shown on these Drawings, Review is for general conformance with design concept of the Project and general compliance with the information given in the Contract Documents. Contractor is responsible for dimensions, which shall be confirmed and correlated at the Jobsite, for fabrication processes and techniques or construction, for coordination of Work with that of all other trades and the satisfactory performance of Work.

E. Shop drawings shall show work of all trades including but not limited to:

1. Ductwork.

2. Piping: All trades.

3. Fire and smoke dampers, tag each damper with a unique tag number.

4. Electrical equipment.

5. Main electrical conduits and bus ducts.

6. Equipment supports and suspension devices.

7. Structural and architectural constraints.

8. Show location of:

a. Valves: Manual and automatic.

b. Piping specialties.

c. Dampers: Fire/ smoke, automatic and manual volume, etc.

d. Access doors.

e. Control and electrical panels.

f. Others as required for clear coordination.

F. Drawings shall indicate coordination with work specified in other Divisions which must be coordinated with work specified under Division 22, including (where applicable), but not limited to:

1. Site utilities and irrigation equipment and piping.

2. Cable trays.

3. Computer equipment.

4. Others as required.

1.7 CLOSE-OUT REQUIREMENTS

A. Procedure:

1. Until the documents required in this Section are submitted and approved, the system will not be considered "accepted".

2. Before requesting acceptance of work, submit one set of Completion Documents for review and approval of Owner's Representative.

3. After review, furnish quantity of sets indicated below to Owner.

4. Format

a. Paper copies; assemble in chronological order following alpha-numeric system used in specification, in heavy three-ring binder.

B. Operating and Maintenance (O&M) Manual:

1. In accordance with requirements of Division 1 - General Requirements.

2. O&M Manual shall include but is not limited to the following:

a. Complete Product Data Submittals so that the details of the device are known.

b. Manufacturer's name, model number, service manual, spare-parts list and descriptive literature for all components.

c. Operating instructions.

d. Maintenance and repair requirements.

e. Wiring diagrams.

f. Requirements for special tools, test kits and calibration instructions.

g. Replacement parts list.

h. Valve tag directory.

i. Name, address and phone number of contractor's equipment suppliers and service agencies.

C. Record Drawings:

1. Keep up-to-date during progress of job, one set of reproducible of Plumbing Drawings indicating the Record installation. In addition to changes made during course of Work, show following by dimension from readily obtained base lines:

a. Fully illustrate all revisions made by all trades in the course of work.

b. Include all field changes, adjustments, variances, substitutions and deletions, including all Change Orders.

c. Exact location, type and function of concealed valves, controllers, piping, air vents and piping drains.

d. Exact size, invert elevations and location of underground and under floor piping.

2. Progress drawing set shall be available for inspection by Owner's Representative weekly.

3. Update shop drawings and record drawings to reflect revisions and additional data listed above at completion of Project:

a. Original engineering design drawings will be provided to Contractor in electronic format compatible with AutoCAD version 2011 or later.

b. Both shop and engineering design drawings shall be in format compatible with AutoCAD version 2011 or later.

c. Drawings required to be updated if revisions were made:

1) Floor plans.

2) Shop drawings.

3) Sections.

4) Riser diagrams.

D. Commissioning Reports:

1. Coordinate with Owner's Representative.

E. Miscellaneous Certificates:

1. Pressure and Leakage Test documentation/ certificates.

2. Training/Instruction completion certificates.

3. Fire Marshal and Fire Department approvals of system, as required.

4. Final inspection certificate signed by governing authorities.

5. Warranty period, including start and end period.

6. Field test report, including as applicable:

a. Startup documents with date and name of technician.

b. Piping pressure tests.

c. Drain pan drainage tests.

d. Letters from manufacturers certifying their supervision of equipment installation and start-up procedures.

e. Machinery vibration test reports.

1.8 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Contractor's Options:

1. For products specified only by reference standard, select product meeting that standard, by any manufacturer.

2. For products specified by naming one product or manufacturer, submit request for substitutions for any product or manufacturer which is not specifically named in accordance with substitutions clause. Refer to Division I Specification for substitution procedures.

3. Wherever catalog numbers and specific brands or trade names are used, they are used to establish standards of quality, utility and appearance required.

1.9 DESCRIPTION OF BID DOCUMENTS

A. Drawings:

1. Drawings in general are diagrammatic. Intention is to show size, capacity, approximate location, direction and general relationship of one work phase to another, but not exact detail or arrangement

2. Scaled and figured dimensions are approximate and are for estimating purposes only. Indicated dimensions are limiting dimensions where noted. Piping elevation requirements shall be determined by the Contractor after final coordination with other trades.

3. Before proceeding with work check and verify all dimensions in field.

4. Assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.

5. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom and avoid architectural openings, structural members and work of other trades.

6. For exact locations of building elements, refer to dimensional Architectural and Structural drawings.

B. Do not use equipment exceeding dimensions indicated on drawings or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions.

C. If any part of Specifications or Drawings appears unclear or contradictory, apply to Owner's Representative for an interpretation and decision as early as possible.

1. Do not proceed with work without the decision of the Owner's Representative.

1.10 PROJECT CONDITIONS

A. Examine site related work and surfaces before starting work of any Section:

1. In case of conflict, the most stringent takes precedence.

2. For purposes of clarity and legibility, Drawings are essentially diagrammatic to extent that many piping offsets, bends, unions, special fittings, exact locations of items are not indicated, unless specifically dimensioned. Especially note a number of required pipe offsets to coordinate with structure are not shown. Coordinate dimensioned conditions, including invert elevations, with other trades prior to installation by any trade.

3. Exact routing of piping, etc. shall be governed by structural conditions, obstructions. Not all offsets in piping are shown on the plumbing drawings. Determine which item to offset or relocate. Maintain required slope in piping. Make use of data in Contract Documents. In addition, Owner's Representative reserves right, at no additional cost to the Owner, to make any reasonable change in location of mechanical items, exposed at ceiling or on walls, to group them into orderly relationships or increase their utility. Verify Owner's Representative's requirements in this regard prior to rough-in.

4. Take dimensions, location of doors, partitions, similar physical features from Architectural Drawings. Verify at Site under this Division. Consult Architectural Drawings for exact location of outlets to center with Architectural features, panels, etc., at the approximate location shown on plumbing drawings.

5. Mounting heights of brackets, outlets, etc., as required.

6. Report to Owner's Representative, in writing, conditions which will prevent proper provision of this work.

7. Beginning work of any Section without reporting unsuitable conditions to Owner's Representative constitutes acceptance of conditions by Contractor and any adjustments after the beginning of work shall be performed at no cost to the Owner.

8. Perform any required removal, repair or replacement of this work caused by unsuitable conditions at no additional cost to the Owner.

B. Coordination:

1. Work out all congested conditions involving Work specified under this Division and Work in other Divisions in advance of installation. If necessary, and before Work proceeds in these areas, prepare supplementary Drawings under this Division for review showing all Work in congested area. Provide supplementary Drawings, additional Work necessary to overcome congested conditions, at no additional cost to the Owner.

2. Conflicts: Difference or disputes concerning coordination, interference or extent of Work between sections shall be decided as follows:

   a. Install plumbing and electrical systems in the following order of preference (those trades listed below another must reroute to resolve the conflict):

      1) Drain piping required by code to be sloped.

      2) Electrical conduit 4 inches and larger.

      3) Domestic water piping.

      4) Fire sprinkler piping.

      5) Electrical conduit smaller than 4 inches.

      6) Control system piping and wiring.

   b. Continued disputes shall be decided by Contractor and Contractor's decision, if consistent with Contract Document requirements, shall be final.

3. Supervision: An authorized and competent representative shall constantly supervise the work from beginning to completion.

4. Provide templates, information and instructions to other Divisions to properly locate holes and openings to be cut or provided.

5. The drawings govern in matters of quantity, and the specifications govern in matters of quality. In the event of conflict within the drawings involving quantities, or within the specifications involving quantities, or within the specifications involving quality, the greater quantity and higher quality shall apply. Such discrepancies shall be noted and clarified in the Bid. No additional allowances will be made because of errors, ambiguities, or omissions that reasonably should have been discovered during the preparation of the Bid.

C. Equipment Rough-In:

1. Rough-in locations shown on plumbing drawings for equipment furnished by the Owner and for equipment furnished under other Divisions are approximate only. Obtain exact rough-in locations from following sources.

   a. From Shop Drawings for equipment provided under this contract

b. From Owner's Representative for Owner furnished-Contractor installed equipment

c. From existing equipment where such equipment is relocated under this Contract.

2. Verify plumbing characteristics of equipment before starting rough-in. Where conflict exists between equipment and rough-in shown on Drawings obtain clarification from Owner's Representative and provide as directed by the Owner's Representative at no additional cost to the Owner.

3. Make final connections.

1.11 CLEARANCE FROM ELECTRICAL EQUIPMENT

A. Piping:

a. Prohibited, except as noted, in Electric rooms and closets over equipment, as restricted by CEC.

b. Telephone rooms and closets.

c. Elevator machine rooms.

d. Electric switchboard room.

2. Prohibited, except as noted, over or within 5 feet of:

a. Transformers.

b. Substations.

c. Switchboards.

d. Motor control centers.

e. Standby power plant

f. Bus ducts.

g. Electrical panels.

B. Drip pans under piping:

1. Where piping is located over any electrical equipment listed above, reroute piping if possible rather than use drip pan.

2. 18 gage galvanized steel.

3. 18 gage copper.

4. Reinforced and supported.

5. Watertight

6. With 1-1/4 inch drain outlet piped to floor drain or service sink.

1.12 PRODUCT DELIVERY, HANDLING AND STORAGE

A. See Division I - General Requirements.

B. Deliver equipment in its original package to prevent damage or entrance of foreign matter. Provide materials on factory provided shipping skids and lilting lugs if required for handling, provide protective coverings during construction.

C. Handle and ship in accordance with manufacturer's recommendations.

D. Identify materials and equipment delivered to Site to permit check against approved materials list, reviewed with no exceptions taken Shop Drawings.

E. Protect from loss or damage. Replace lost or damaged materials and equipment with new at no additional cost to the Owner.

F. Where necessary, ship in crated sections of size to permit passing through available space.

1.13 PROJECT MANAGEMENT AND COORDINATION SERVICES

A. See Division I - General Requirements.

B. Overview: Provide a project manager/ engineer for the duration of the Project to coordinate the Division 22 work with all other trades. Coordination services, procedures and documentation responsibility shall include, but shall not be limited to the items listed in this Section.

C. Review of submittals and shop drawings prepared by other subcontractors.

1. Obtain copies of all submittals and shop drawings for equipment provided by others that require electrical service connections or interface with Division 22. Provide the electrical contractor a complete list of all required electrical connections.

2. Perform a thorough review of the submittals and shop drawings to confirm compliance with the service requirements contained in the Division 22 contract documents. Document any discrepancy or deviation as follows:

   a. Prepare report summarizing the discrepancy.

   b. Provide a copy of the specific submittal or shop drawing, indicating via cloud, the discrepancy.

3. Prepare and maintain a submittal and shop drawing review log indicating the following information:

   a. Shop drawing or specification number and brief description of the system/ material.

   b. Date of your review.

   c. Indication if follow-up coordination is required.

D. Request for information (RFI):

1. See Division I - General Requirements.

1.14 REVIEW OF CONSTRUCTION

A. Work may be reviewed at any time by the Owner's Representative

B. Advise Owner's Representative that work is ready for review at following times:

1. Prior to backfilling buried work.

2. Prior to concealment of work in walls and above ceilings.

3. When all requirements of Contract have been complete.

C. Neither backfill nor conceal work without Owner's Representative's consent

D. Maintain on job set of Specifications and Drawings for use by Owner's Representative's: 1. Include all change orders.

E. Contractor is responsible for construction methods, sequences and safety precautions.

1.15 SCHEDULE OF WORK

A. In accordance with Division 1:

1. Arrange work to conform to schedule of construction established or required to comply with Contract Documents.

2. In scheduling, anticipate means of installing equipment through available openings in structure.

1.16 CUTTING AND PATCHING

A. See Division I - General Requirements.

1.17 UTILITY CONNECTIONS

A. Connect to on-site piping mains.

1.18 WARRANTY

A. In accordance with Division 1.

B. Warranty all materials, equipment, apparatus and workmanship to be free of defective materials and faulty workmanship for period of two year from date of filing of Notice of Completion or upon beneficial use, at the direction of the Owner's Representative.

C. Provide new materials, equipment, apparatus and labor to replace that determined by Owner's Representative to be defective or faulty.

D. This guarantee also applies to services including instructions, adjusting, testing, noise, balancing, etc.

E. Furnish Manufacturers' standard Warranties in excess of one year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Alternate manufacturers as identified in each section will be considered under conditions specified in Paragraph 1,9 of this Section.

B. Identify materials, equipment by manufacturer's name, nameplate data. Remove unidentified materials, equipment from Site.

C. Equipment specified by manufacturer's number shall include all accessories, controls, etc., listed in catalog as standard with equipment. Furnish optional or additional accessories as specified.

D. Where no specific make of material or equipment is mentioned, any first class product of reputable manufacturer may be used, provided it conforms to requirements of system and meets with acceptance.

E. Provide an authorized representative to constantly supervise work of this Division, check all materials prior to installation for conformance with Drawings, Specifications, reviewed Submittals and reviewed Shop Drawings.

F. Conform to conditions shown and specified. Coordinate with other trades for best possible assembly of combined Work. Relocate equipment when necessitated by failures to coordinate Work or to advise Owner's Representative of conflicts in writing.

G. Material and Equipment-General Requirements:

1. New.

2. Approved for use by State Fire Marshal.

3. Testing agency labeled or with other identification wherever standards have been established.

4. Owner's Representative reserves right to reject items not in accordance with Specification either before or after installation.

5. Comprised to render complete and operable systems; provide additional items needed to complete installation to conform with design intent.

6. Compatible with space allocated; modifications necessary to adjust items to space limitations at Contractor's expense.

7. Installed fully operating and without objectionable noise or vibration.

8. Design of plumbing systems is generally based on product of the first named manufacturers cited. Where systems for product installed necessitate modification of systems shown on drawings, Contractor is responsible for installation of systems appropriate to product installed.

9. For interior applications use paints and coatings that comply with requirements of Division 1, CalGreen Standards and VOC limitations.

H. Electrical Requirements

1. Electrical Work performed under Divisions 22 shall conform to requirements of Division 26- Electrical.

2. Provide weatherproof devices and installation for out-of-doors work.

PART 3 - PART 3 EXECUTION

3.1 INSPECTION

A. Verify that conditions are satisfactory for the installation of materials and equipment. Make field measurements to ensure that items will fit in the space available. Verify that penetrations and blocking have been installed properly and located correctly. Notify Owner's Representative if conditions are not satisfactory and do not commence work until conditions have been corrected.

3.2 INSTALLATION

A. Install materials and equipment in compliance with governing codes.

B. Use printed descriptions, specifications and recommendations of manufacturers as a guide for installation of Work, Follow in all cases where manufacturers' of articles used furnish directions covering points not specified or shown.

C. Equipment

1. See Division I - General Requirements.

2. Assemble equipment which is required to be field assembled under the direct supervision of the manufacturers' agent.

3. Prior to the final acceptance submit letters from the manufacturers that equipment has been assembled under the direct supervision of the manufacturers' agent

4. Accurately set and level equipment with supports neatly placed and properly fastened.

5. Properly fasten equipment in place with bolts to prevent movement during a seismic event

6. Coordinate the installation of equipment with openings in structure.

7. Arrange piping and equipment for ready access to valves, unions and adequate clearances for maintenance and service.

8. Coordinate and fully dimension steel or wood supports for plumbing equipment where shown on drawings with installing contractor.

9. Provide all roof and piping penetrations, etc.

10. Concrete:

    a. Concrete work, include forming, steel bar reinforcing, cast-in-place concrete, finishing and grouting is specified under Division 3- Concrete.

    b. Coordinate and fully dimension concrete housekeeping pads and curbs with installing contractor; dimensions shall be as required for structural and seismic requirements.

D. Electrical:

1. See Division 26 - Electrical.

2. Install electrical devices with code required clearances and access.

3. Assist the electrical contractor in the proper connecting of all electrical wiring and equipment required for plumbing equipment

E. Sleeves, Chases and Concrete Inserts:

1. Provide all required sleeves, chases, concrete inserts, anchor bolts, etc.

2. Sleeves, chases are prohibited in structural members, except where shown or as approved by SEOR or directed by Owner's Representative in writing.

3. Do not embed piping in concrete.

F. Escutheons: Provide spring clamp plates where pipes run through walls, floors or ceilings and are exposed in finish locations of the building. Plates shall be chrome plaated heavy brass of plain pattern and shall be set tight to pipe and building surface.

G. Waterproof Construction:

4. Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of piping penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls.

5. All penetrations through vapor barriers at slabs on grade shall be taped and made vapor tight.

H. Restoration of Damage:

6. Repair or replace, as directed by Owners Representative, materials and parts of premises which become damaged.

7. Remove replaced parts from premises at no additional cost to the Owner.

I. Review architectural drawings and coordinate with Architect and other contractors to be sure that all architectural shafts, plenums, rated duct enclosures etc. required for plumbing systems are properly located and dimensioned.

3.3 PROTECTION OF MATERIALS

A. See Division 1- General Requirements.

B. Completely cover motors and other moving machinery to protect from dirt and water during construction.

C. Cap all openings in pipe daily to protect against entry by foreign matter.

D. Material, equipment or apparatus damaged because of improper storage or protection will be rejected.

1. Remove from site and provide new, duplicate, material, equipment or apparatus in replacement of that rejected.

E. Perform Work in manner precluding unnecessary fire hazard.

3.4 ADJUSTMENT

A. Preliminary Operation:

1. Operate any portion of installation for Owner's convenience if so requested by Owner's Representative. Such operation does not constitute acceptance of Work as complete but does constitute beneficial use. Cost of utilities, such as gas and electrical power, will be borne by the Owner if operation is requested by Owner's Representative.

B. Startup Service:

1. Prior to startup, ensure that systems are ready, including checking the following: proper equipment rotation, proper wiring, auxiliary connections, lubrications, controls and properly set relief and safety valves.

2. Start and operate all systems.

3. Provide services of factory trained technicians for startup of major equipment and systems including EMS, etc.

4. Life Safety Testing,

a. Correct any problems related to equipment supplied under Divisions 22.

b. Provide all tests required to start and commissioning the system and for assisting the design/ construct team in demonstrating system compliance to DSA inspector.

C. Noise:

1. Cooperate in reducing any objectionable noise or vibration caused by plumbing systems to the extent of adjustments to specified and installed equipment and appurtenances.

2. Completely correct noise problems caused by failure to make installation in accordance with Contract Documents, including labor and materials required as a result of such failure, at no additional cost to the Owner.

3.5 SPECIAL TOOLS

A. Furnish to Owner at completion of work:

1. One set of any special tools required to operate, adjust, dismantle or repair equipment furnished under any section of this Division.

2. Pressure gage and temperature sensor for piping test plug.

3.6 CLEANING

A. Cleaning 1, See Division 1.

B. Thoroughly clean equipment, fans, pumps, motors, piping and other materials under this Division free from all rust, scale and all other dirt before any covering or painting is done, or the systems put in operation; leave in condition satisfactory to Owners Representative.

C. At all times keep the premises free from accumulation of waste material and debris caused by his employees. At the completion of the Project, and at other times as Owners Representative may direct, remove refuse from within and around the building. All tools, scaffolding and surplus materials shall also be removed, leaving the Site of his Work clean.

D. Completely cover all motors and other moving machinery to prevent entry of dirt and water during construction.

3.7 PAINTING

A. Cleaning 1, See Division 1.

B. Painting:

1. Piping exposed to outdoors:

a. One coat primer.

b. Two coat alkyd oil paint, UV resistant for PVC piping, color as indicated.

c. Not required for copper, galvanized steel, or insulated piping.

2. Steel hangers and supports exposed to outdoors:

a. One coat primer.

b. Not required for galvanized steel.

3. Marred surfaces of factory painted equipment

a. Spot coat to match adjacent coat.

4. Insulation exposed to sunlight See Section 22 0529 - Hangers, Supports, Mechanical Vibration and Seismic Controls and Section 22 0700 - Piping and Equipment Insulation.

C. Execution:

1. Protect flooring and equipment with drip cloths.

2. Paint and materials stored in location where directed.

3. Oily rags and waste removed from building every night.

4. Wire brush and clean off all oil, dirt and grease areas to be painted before paint if applied.

5. Workmanship:

a. No painting or finishing shall be done with:

1) Dust laden air.

2) Unsuitable weather conditions.

3) Space temperature below 60 degrees Fahrenheit

b. Pipes painted containing no heat and remain cold until paint is dried.

c. Paint spread with uniform and proper film thickness showing no runs, sags, crawls or other defects.

d. Finished surfaces shall be uniform in sheen, color and texture.

e. e. All coats thoroughly dry before succeeding coats are applied, minimum 24 hours between coats.

f. f. Priming undercoat of slightly different color for inspection purposes. 6. Piping continuously painted in all exposed areas.

D. Paint:

1. High gloss medium or long alkyd paint.

2. Best grade for its purpose.

3. Deliver in original sealed containers.

4. Apply in accordance with manufacturer's instructions.

E. Colors:

1. Colors as directed by Architect or Owner's Representative unless specified herein.

2. Uncoated hangers, supports, rods and insets: dip in zinc chromate primer.

F. Factory Finish:

1. Ceiling and wall mounted air outlets in acoustical tile ceilings: Baked white enamel.

2. Aluminum air outlets that are not to be painted: anodized.

G. Marred surfaces of prime coated equipment and piping: spot prime coat to match adjacent coat.

H. Properly prepare Work under this Division to be finish painted under other Division.

I. Provide moisture resistant paint for exterior painting and heat resisting paint for hot piping, equipment and materials.

J. Factory Finishes:

1. Pumps, compressors, tanks and like items.

2. Pumps, water heaters and like items were exposed.

K. For the following, provide factory prime coat. Also, provide factory finish painting on each if not specified in Division 9.

1. Other air outlets.

L. Paint all equipment out-of-doors and equipment supports with two coats of weather resistant enamel.

M. Protect all finished surfaces of fixtures with heavy paper pasted thereon, or by other means, throughout the period of construction.

N. Refinish Work supplied with final finish under this Division if damaged under this Division to satisfaction of Owner's Representative.

3.8 FIELD QUALITY CONTROL

A. See Division I - General Requirements.

B. Tests:

1. Perform as specified in individual sections and as required by authorities having jurisdiction.

2. Duration as noted.

C. Provide required labor, material, equipment and connections for tests.

D. Furnish written report and certification that tests have been satisfactorily completed.

E. Repair or replace defective work, as directed by Owner's Representative in writing, at no additional cost to the Owner.

F. Restore or replace damaged work due to tests as directed by Owner's Representative in writing, at no additional cost to the Owner.

G. Restore or replace damaged work of others, due to tests, as directed by Owner's Representative in writing, at no additional cost to the Owner.

H. Remedial work shall be performed to the satisfaction of the Owner's Representative, at no additional cost to the Owner.

I. Remedial work shall include performing any commissioning or other tests related to remedial work an additional time at no additional cost to the Owner.

J. Provide training to Owner’s maintenance staff and Operating and Maintenance Manuals in pdf and (2) hard copy manuals in Three Ring Binders.

END OF SECTION

SECTION 22-0100 - BASIC PLUMBING MATERIALS, METHODS AND IDENTIFICATION

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.

B. Other Sections of the Specifications:

1. Mechanical Sections 23
2. Electrical Sections 26

C. This Section includes the following

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Equipment installation requirements common to equipment sections.
7. Supports and anchorages.
8. Equipment nameplates, markers and signs.
9. Pipe tags.
10. Acoustical caulking.
11. Access doors and panels.
12. Pipe testing.

1.2 SUBMITALS

A. Welding certificates.

B. Product data.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. Above Grade: Not buried in ground and not embedded in concrete slab or ground.

G. Below Grade: Buried in ground or embedded in concrete slab on ground.

H. Furnish: Supply and deliver complete.

I. Install: Place, secure, and connect as required to make fully operational.

J. Provide: Furnish and install as defined above; perform work.

1.4 QUALITY ASSURANCE

A. The California State Health and Safety Code, Section 116875, effective January 1, 2010, states in part and requires that, no person shall use any pipe, pipe or plumbing fitting or fixture, or solder or flux that is not lead free in the installation or repair of any public water system or any plumbing in a facility providing for human consumption except when necessary for the repair of leaded joint of cast iron pipe. Plumbing fixtures, fittings and pipes that are installed where the water is not intended for human consumption through drinking or cooking are not subject to the requirements of this law.

B. Steel Support Welding: Qualify processes and operators according to AWS D 1.1, "Structural Welding Code--Steel."

C. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B 31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current

D. ASME Compliance: Comply with ASME A 13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping or required by these Specifications.

E. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

F. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of the specified products of types, materials, and sizes required, and whose products have been in satisfactory use in similar service for not less than 5 years.

G. By accepting to work, the Contractor agrees that he has reviewed all drawings and specifications as they relate directly or indirectly to his trade, that he has understood the intent of the design and the specifications requirements and is reasonably sure that they can be accomplished by proceeding in accordance with these drawings and specifications.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 Piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B 1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 Piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B 16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASMB 813.

D. Brazing Filler Metals: AWS A 5.8, B-CuP Series or Bag-1, unless otherwise indicated.

E. Welding Filler Metals: Comply with AWS D 10.12.

2.3 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180°F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225°F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225°F.

2.4 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Carbon steel. Include two for each sealing element

D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Galvanized-Steel Sheet 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded FE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With setscrew. 1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw. 1. Finish: Polished chrome-plated.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

2.8 EQUIPMENT AND SYSTEMS IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment

1. Data:

a. Manufacturer, product name, model number, and serial number.

b. Capacity, operating and power characteristics, and essential data.

c. Labels of tested compliances.

d. Location: Accessible and visible.

2. Fasteners: As required to mount on equipment

B. Use color labels on ceilings to identify main equipment, shut-off valves and all other devices requiring maintenance and access. Coordinate with Architect and District Facilities Department

2.9 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme. Provide 5/32-inch hole for fastener.

1. Material: 0.032-inch thick brass.

2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

2.10 ACOUSTICAL CAULKING

A. Acoustical caulking shall be applied in continuous beads. The material shall be resilient and non-setting.

B. The following are acceptable:

1. Acoustical Sealant, U.S. Gypsum.

2. Acoustical Sealant, The Tremco Manufacturing Company.

3. AS-1 0 Acoustical Sealant, Macco Adhesives.

4. BA-97, BA-98 Acoustical Sealant, Pecora Chemical Corp.

5. #313 Sound Control Sealant, The W.W. Henry Company or approved equal.

2.11 ACCESS DOORS AND PANELS

A. Where required. Wherever a piece of equipment or valve, and operator, etc. is inaccessible and requires access for maintenance, repair, testing or adjustments.

B. Access panels installed in walls shall be a minimum of 14" x 14" painted steel. If indicated on the drawings or if the accessed equipment, valve, etc. requires it, provide larger access door and panels to provide convenient access for the maintenance department. Where located in custodial or mechanical rooms they shall be painted steel.

C. Access panels installed in ceilings shall be a minimum of 14" x 14" steel painted to match ceiling color. If indicated on the drawings or if the accessed equipment, valve, etc. requires it, provide larger access door and panels to provide convenient access for the maintenance department

D. Refer to drawings for location and sizes and coordinate with Architect and District for exact locations and color (where painted).

E. Manufacturers:

1. Inryco/Milcor

2. Bilco

3. Cesco

4. Karp

F. Openings:

1. Coordinate and fully dimension all openings in walls, floors, roofs and structural elements required for plumbing work.

2. Provide all required fire-stopping around pipe and other penetrations required for plumbing work in rated partitions where required by code.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.

2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 for materials.

Q. Verify final equipment locations for roughing-in.

R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A 5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B 1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D 10.12, using qualified processes and welding operators according to Parti "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 EXCAVATION AND BACKFILL

A. Refer to Division 2 for additional excavation and backfill requirements.

B. Install underground piping with a minimum of 24" cover from finish grade, or as noted on drawings.

C. Cut excavation for pipes a minimum of 6" below the required grade. Provide a 6" bed of sand or other approved material properly compacted to provide an accurate grade and uniform bearing throughout the length of the pipe.

D. Backfill with a 6" layer of sand or other approved material over top of the pipe or pipes. Provide compaction to 90 percent at 6" layer increments, unless otherwise specified.

E. Use sand certified to a resistance of not less than the surrounding soil when wet with distilled water and consisting of clean, natural washed sand with particles of size which will pass through a 3/8" screen, 90% will pass through a 1/4" screen, and 25% will pass through a No. 50 screen.

F. Backfilling will not be placed until the work has been inspected, tested and approved.

G. Clods or lumps 2" in size or larger will not be permitted in the backfilL If excavated material is not suitable, provide adequate material by hauling from other locations.

H. Remove surplus earth or material remaining after backfilling from the site.

I. Provide concrete cover. Concrete shall match existing concrete in thickness, color and finish. Provide wire mesh steel reinforcement Provide a minimum of three days curing time. Keep concrete continuously moist during curing time.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment

2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment

C. Field Welding: Comply with AWS D1.1

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.8 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of plumbing equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment

1. Pumps and water heaters.

2. Identify on ceilings, main shut-off valves, etc.

3.9 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following (use same for piping):

1. Valve-Tag Size and Shape:

   a. Cold Water: 1-1/2 inches round.

   b. Hot Water: 1-1/2 inches round.

   c. Gas: 1-1/2 inches round.

2. Valve-Tag Color:

   a. Cold Water: Green.

   b. Hot Water: Yellow.

c. Gas: Black.

d. Compressed Air: Green

3. Letter Color:

a. Cold Water: Black.

b. Hot Water: Black

c. Gas: Black.

3.10 PIPING IDENTIFICATION

A. Identify all pipelines with adhesive markers, indicating the contents and direction of flow. Marker spacing shall be 20 feet maximum and markers shall be installed where piping changes direction or passes through walls or floors. All piping at all equipment such as water heaters shall be marked. Markers to be Brady or Perma-Color, with the background color coding as follows. Coat with clear lacquer after installation.

1. Piping System Color

a. Domestic Cold Water Yellow

b. Domestic Hot Water and Return Yellow

c. Waste and Vent Green

d. Interior Rainwater Leaders Green

e. Natural Gas Yellow

f. Condensate Green

3.11 PENETRATIONS OF DRYWALL CONSTRUCTIONS

A. The Contractor shall ensure that the sound control performance of structures be maintained in accordance with the drawings and specifications. All penetrations shall be installed in a manner that results in complete air tightness through structure. If a condition occurs where penetration of the structure by a pipe, conduit, etc., is not shown clearly on the drawings (or described in the specifications), the Contractor shall ask immediately for clarification of the method necessary to install the particular item.

B. The following shall apply to all penetrations in walls requiring a minimum Sound Transmission Class STC 49 performance. For penetrations of pipes, conduit, etc., with minimum dimension or diameter exceeding 311, the

gypsum board layers shall be framed around the penetration allowing for a 1" annular gap. The length of the pipe or conduit that penetrates the construction shall be wrapped with lit thick, 3 1b/ft3 density glass or mineral fiber. This shall be held in place at either end by a 1-1/4' diameter or 1-1/4" square polyethylene or neoprene closed cell sponge backing rod. A total of 4 beads of acoustical caulking (2 at each end) shall be applied continuously around the penetration as shown in the drawings.

C. For penetrations of pipes, conduit, etc., with maximum dimension or diameter not exceeding 3, the hole in the wall need not be framed out Pipes/conduits sized in the range 1" to 3" diameter shall be packed with glass or mineral fiber, held in place with backing rod and caulked as indicated above for larger size penetrations. Pipes/ conduits with diameters up to 1" may be fitted with 1-1/2" wide x 3/4" thick (compressed to 1/2") neoprene closed cell sponge collars as they penetrate each side of the wall.

D. Confirm requirements with Owner's Representative.

3.12 PIPE TESTING

A. Test piping as noted below with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.

TEST SCHEDULE			
System	Test Medium	Test Pressure	Test Time
Gas	Air	50 psig	1 hour
Water	Water	150 psig	4 hours
Waste/Vent	Water	15 feet	2 hours
Rainwater Leaders	Water	15 feet	2 hours

END OF SECTION

SECTION 22-0500 - PLUMBING SPECIALTIES

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.

B. Section 22 0000 - General Plumbing Provisions

C. Section 22 0100 - Basic Plumbing Materials, Methods and Identification

1.2 SUMMARY

A. This Section includes the following plumbing specialties:

1. Backflow preventers.
2. Balancing valves.
3. Water tempering valves.
4. Strainers.
5. Trap seal primer valves.
6. Drain valves.
7. Miscellaneous piping specialties.
8. Cleanouts.
9. Floor drains.

B. Refer to drawings for manufacturers' model numbers.

1.3 PERFORMANCE REQUIREMENTS

A. A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

1. Domestic Water Piping 125 psig.
2. Sanitary Waste, Vent Piping and Condensate Drains: 15-foot head of water.

3. Storm Drainage Piping 10-foot head of water.

1.4 SUBMITTALS

A. Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following

1. Backflow preventers.

2. Balancing valves and strainers.

3. Thermostatic water mixing valves and water tempering valves.

4. Water hammer arresters, air vents, and trap seal primer valves and systems.

5. Hose bibs and water hydrants.

6. Backwater valves, cleanouts, floor drains, open receptors, and trench drains.

B. Field quality-control test reports.

C. Operation and maintenance data for the following

1. Backflow preventers.

2. Trap seal primer valves and systems.

3. Water tempering valves

1.5 QUALITY ASSURANCE

A. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASME Compliance: Comply with ASME B 31.9, "Building Services Piping," for piping materials and installation.

D. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include

marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.

2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

2. Products: Subject to compliance with requirements, provide one of the products specified.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 BACKFLOW PREVENTERS

A. Manufacturers: 1. Wilkins.

B. General: ASSE standard, backflow preventers.

1. NPS 2 and Smaller: Bronze body with threaded ends.

2. Ni'S 2-1/2 and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends. a. Interior Lb-tin. AWWA C 550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.

3. Interior Components: Corrosion-resistant materials.

4. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.

5. Strainer: On inlet

C. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent

D. Hose-Connection Vacuum Breakers: ASSE 1011, nickel-plated, with non-removable and manual drain features, and ASME B 1.20.7, garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze, unless otherwise noted or shown on drawings.

E. Refer to drawings for model number.

2.3 BALANCING VALVES

A. Calibrated Balancing Valves: Adjustable, with two readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.

B. Manufacturers:

1. Calibrated Balancing Valves:

a. Amtrol, Inc.

b. ITT Industries; Bell & Gossett Div.

c. Watts Industries, Inc.; Water Products Div.

2. NPS 2 and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.

3. NPS 2 and Smaller: Bronze, Y-pattern body with adjustment knob and threaded ends.

4. NPS 2-1/2 and Larger: Cast-iron, Y-pattern body with bronze disc and flanged or grooved ends.

2.4 WATER TEMPERING VALVES

A. Manufacturers: 1. Powers.

B. Refer to drawings for model number.

2.5 STRAINERS

A. Manufacturer: 1. Wilkins

B. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch round perforations, unless otherwise indicated.

1. Pressure Rating: 125-psig minimum steam working pressure, unless otherwise indicated.

2. NPS 2 and Smaller: Bronze body, with female threaded ends.

3. NPS 2-1/2 and Larger: Cast-iron body, with interior AWWA C 550 or FDA-approved, epoxy coating and flanged ends.

4. Y-Pattern Strainers: Screwed screen retainer with centered blowdown.

   a. Drain: Pipe plug.

5. T-Pattern Strainers: Malleable-iron or ductile-iron body with grooved ends; access end cap with drain plug and access coupling with rubber gasket

6. Basket Strainers: Bolted flange or clamp cover, and basket with lift-out handle.

   a. Type: Simplex with one basket

   b. Drain: Pipe plug.

C. Drainage Basket Strainers: Non-pressure-rated, cast-iron or coated-steel body; with bolted flange or clamp cover and drain with plug.

1. Basket Bronze or stainless steel with 1/8- or 3/16-inch-diameter holes and lift-out handle.

2. Female threaded ends for NPS 2 and smaller and flanged ends for NI'S 2-1/2 and larger.

2.6 TRAP SEAL PRIMER VALVES

A. Trap Seal Primer System: Factory-fabricated, adjustable, automatic-operation assembly for in wall mounting with the following:

1. Manufacturers:

   a. Precision Plumbing Products, Inc.: PR500

2. Or approved equal

2.7 DRAIN VALVES

A. Hose-End Drain Valves: MSS SP 110, NI'S 3/4 ball valve, rated for 400-psig minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

1. Inlet Threaded or solder joint.

2. Outlet Short-threaded nipple with ASME B 1.20.7, garden-hose threads and cap.

B. Hose-End Drain Valve: MSS SP 80, gate valve, Class 125, ASTM B 62 bronze body, with NPS 3/4 threaded or solder-joint inlet and ASME B 1.20.7, garden-hose threads on outlet and cap. Hose bibbs are prohibited for this application.

C. Stop-and-Waste Drain Valves: MSS SP 110, ball valve, rated for 200-psig minimum CWT or MSS SP 80, Class 125, gate valve; ASTM B 62 bronze body, with Ni'S 1/8 side drain outlet and cap.

2.8 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or I'DI WI-I 201, metal-bellows type with pressurized metal cushioning chamber. Sizes indicated are based on ASSE 1010 or PDI WI-I 201, Sizes A through F. Lifetime guarantee.

1. Zurn Industries, Inc.: Zurn WH2950XL for less than 2” piping or Z1700 “Shoktrol” for 2” and larger. Size shock absorbers based on fixture units of each branch. Locate between the last two fixtures of each branch.

2. Or approved equal

B. Hose Bibbs: Bronze body with replaceable seat disc complying with ASME A 112.18.1M for compression-type faucets. Include NI'S 1/2 or NI'S 3/4 threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig; integral, nonremovable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B 1.20.7 on outlet, unless noted or shown otherwise on drawings.

1. Interior Hose Bibs: Woodford MB-26-3/4” with anti siphon vacuum breaker and loose key option.

2. Exterior Hose Bibs (Wall Hydrants): Woodford MB65C-4 freezeless wall hydrant in stainless steel box with anti siphon vacuum breaker and ¾” inlet.

C. Air Vents: Float type for automatic air venting.

1. Bolted Construction: Bronze body with replaceable, corrosion-resistant metal float and stainless-steel mechanism and seat; threaded NI'S 3/8 Ni'S 1/2 minimum inlet; 125-psig minimum pressure rating at 140 deg F; and threaded vent outlet.

2. Welded Construction: Stainless-steel body with corrosion-resistant metal float, stainless-steel mechanism and seat, threaded NI'S 3/8

minimum inlet, 150-psig minimum pressure rating, and threaded vent outlet.

D. Open Drains: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting, joined with ASTM C 564, rubber gaskets.

E. Deep-Seal Traps: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap seal primer valve connection.

1. NP'S 2. 4-inch- minimum water seal.

2. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

F. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

G. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semi-open top with threads or device to secure drainage inlet piping in top and bottom spigot or threaded outlet larger than top inlet Include design complying with ASME A 112.1.2 that will provide fixed air gap between installed inlet and outlet piping.

H. Stack Flashing Fittings: Counter-flashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.

I. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.

J. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counter-flashing.

K. Downspout Boots: ASTM A 74, Service class, hub-and-spigot, cast-iron soil pipe. Refer to drawing detail.

L. Conductor Nozzles: Bronze body with threaded inlet for connected conductor size, and bronze wall flange with mounting holes.

1. Finish: Nickel bronze.

2.9 CLEANOUTS

A. Cleanouts: Comply with ASME A 112.36.2M, ASME A 112.3.1.

1. Application: Floor cleanout, wall cleanout, for installation in exposed piping.

2. Manufacturers:

   a. Zurn Industries, Inc.

3. Body or Ferrule Material: Cast iron

4. Clamping Device: Required.

5. Outlet Connection: Per related piping type.

6. Closure: Brass plug with straight threads and gasket

7. Adjustable Housing Material: Cast iron with set-screws or other device.

8. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.

9. Frame and Cover Shape: Round.

B. CLEANOUTS:

1. Floor (FCO): ZURN Z1400-K floor cleanout with anchor flange and adjustable top or approved equal.

2. Wall (WCO): ZURN Z1443 Cleanout with nickel bronze access cover or approved equal.

3. Grade (COTG): Z1474 Heavy duty cleanout housing with Bronze top or approved equal.

2.10 FLOOR DRAINS

A. Floor Drains: Comply with ASME A 112.21.IM, ASME A 112.3.1.

1. Application: Area drains, floor drains, funnel floor drains, floor sinks.

2. Manufacturers:

   a. Zurn Industries, Inc.: ZD-415-B

   b. J.R. SMITH or approved equal

3. Body Material: Cast iron.

4. Seepage Flange: Required.

5. Clamping Device: Required.

6. Outlet Bottom, side.

7. Top or Strainer Material: Nickel bronze.

8. Top of Body and Strainer Finish: Nickel bronze.

9. Inlet Fitting, Gray iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

10. Trap Material: Cast iron.

11. Trap Features: Trap seal primer valve drain connection.

PART 3 - EXECUTION

A. Refer to Section 220100 - Basic Plumbing Materials, Methods, and Identification for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may he sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backllow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.

3. Do not install bypass piping around backflow preventers.

C. Install strainers on supply side of each control valve and solenoid valve.

D. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of ipercent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

E. Install expansion joints on vertical risers, stacks, and conductors if indicated.

F. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.

2. Locate at each change in direction of piping greater than 45 degrees.

3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.

4. Locate at base of each vertical soil and waste stack.

G. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.

H. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

I. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.

J. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.

K. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

L. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated. Comply with ADA requirements.

1. Position floor drains for easy access and maintenance.

2. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

3. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

M. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

N. Fasten recessed-type plumbing specialties to reinforcement built into walls.

O. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.

P. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations. Refer to Section 22 0523 - Valves for general-duty ball, butterfly, check, gate, and globe valves.

Q. Install air vents at piping high points. Include ball, gate, or globe valve in inlet and drain piping from outlet to floor drain.

R. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

S. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Install piping adjacent to equipment to allow service and maintenance.

B. Connect plumbing specialties and devices that require power according to Division 26 Sections.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each backflow preventer, thermostatic water mixing valve, water tempering valve, trap seal primer system.

1. Text: Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

2. Refer to Section 22 0100 - Basic Plumbing Materials, Methods, and Identification for nameplates and signs.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops

END OF SECTION

SECTION 22-2000 FUEL GAS PIPING

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.

B. Section 22 0000 - General Plumbing Provisions

C. Section 22 0100 - Basic Plumbing Materials, Methods and Identification

1.2 SUMMARY

A. This Section includes all fuel gas piping from the gas meter to within and including interior piping. This includes connection to gas meter with shutoff valve and earthquake valve, gas regulators, valves and boxes, etc. Verify and coordinate installation of gas meter with the utility company.

1.3 SUBMITTALS

A. Product Data: For the following-

1. Piping and fittings: Include pressure rating and data of selected product.
2. Regulators.
3. Shutoff valves.
4. Concrete boxes with covers.
5. Earthquake valve.

B. Shop Drawings: For fuel gas piping. Include plans and attachments to other work.

C. Welding certificates.

D. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Welding Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

B. NFPA Standard: Comply with NFPA 54, "National Fuel Gas Code." 1.5

1.5 PROJECT CONDITIONS

A. Gas System Pressure: .25 PSIG.

B. Design values of fuel gas supplied for these systems are as follows:

1. Nominal Heating Value: 1000 Btu/cu.ft.

2. Nominal Specific Gravity: 0.6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 'Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

A. Steel Pipe: ASTM A53/A53M; Type E or 5; Grade B; black Wall thickness of wrought-steel pipe shall comply with ASME B 36.10M.

1. Malleable-Iron Threaded Fittings: ASME B 16.3, Class 150, standard pattern, with threaded ends according to ASME B 1.20.1.

2. Steel Threaded Fittings: ASME B 16.11, forged steel with threaded ends according to ASME B 1.20.1.

3. Steel Welding Fittings: ASME B 16.9, wrought steel or ASME B 16.11, forged steel.

4. Unions: ASME B 16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B 1.20.1.

5. Cast-Iron Flanges and Flanged Fittings: ASME B 16.1, Class 125.

6. Joint Compound and Tape: Suitable for natural gas.

7. Steel Flanges and Flanged Fittings: ASME B 16.5.

8. Gasket Material: Thickness, material, and type suitable for natural gas.

9. Polyethylene (PE) natural gas yard piping. Piping and fittings shall comply with the following standards: ASTM D 2513-96a, PE3406, PE3408, PE2306, PE2406. Tracer wire shall be an electrically continuous insulated number 18 AWG yellow 0.040" diameter copper wire. Natural gas yard piping installation shall comply with California Plumbing Code and Installation Standard IAPMO 1612-93.

2.4 PROTECTIVE COATING

A. Furnish all steel pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for underground applications.

2.5 SPECIALTY VALVES

A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B 1.20.1 for pipe threads.

B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B 16.5 for steel flanges and according to ASME B 16.24 for copper and copper-alloy flanges.

C. Gas Valves, NPS 2 and Smaller: ASME B 16.33 and CSA International-listed bronze body.

1. Manufacturers:

a. Homestead:

1) Figure 601 and 602 semi-steel, lubricated plug, lever handle, 200 lb.

2. Tamperproof Feature: Include design for locking.

3. Provide a stem extension for the homestead plug valve as indicated by the manufacturer to be used with below ground valves. A tee-handled, hollow-stemmed socket wrench with adapter can be used to operate the valve.

D. Plug Valves, NPS 2-1/2 and Larger: ASME B 16.38 and MSS SF 78 cast-iron, lubricated plug valves, with 125-psig pressure rating.

1. Manufacturers:

   a. Homestead:

      1) Figure 652.

2. Tamperproof Feature: Include design for locking.

3. Provide a stem extension for the homestead plug valve as indicated by the manufacturer to be used with below ground valves. A tee-handled, hollow-stemmed socket wrench with adapter can be used to operate the valve.

2.6 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme. Provide 5/32-inch hole for fastener.

1. Material: 0.032-inch thick brass.

2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

2.7 FLEXIBLE APPLIANCE AND/OR HEATING AND VENTILATING EQUIPMENT CONNECTIONS

A. Metraflex braided stainless steel flexible hose. AGA listed and/or approved.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for fuel gas piping system to verify actual locations of piping connections before equipment installation.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

3.3 PIPING APPLICATIONS

A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.

B. Underground (Outside Building Lines) - polyethylene pipe and fittings. Transitions to above grade shall be plastic coated steel unless otherwise noted or shown.

C. Above Grade - steel pipe and fittings. Steel gas pipe 2" and smaller - screwed pipe and fittings 2-1/2" and larger welded joints.

D. Exterior pipe shall be galvanized.

3.3 VALVE APPLICATIONS

A. Piping Line Valves, NPS 2 and Smaller: Gas valve.

B. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve or general-duty valve.

3.4 PIPING INSTALLATION

A. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

B. Connect branch piping from top or side of horizontal piping.

C. Install unions in pipes NPS 2 and smaller, adjacent to each valve. Unions are not required on flanged devices.

D. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.

3.5 JOINT CONSTRUCTION

A. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.

B. Ground equipment according to Division 26. 1. Do not use gas pipe as grounding electrode.

3.7 PAINTING - USE MATERIALS AND PROCEDURES IN DIVISION 9.

3.8 FIELD QUALITY CONTROL

A. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction.

B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

C. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.

D. Verify correct pressure settings for pressure regulators.

E. Verify that specified piping tests are complete.

END OF SECTION

SECTION 22-2200 DRAINAGE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 22 0000 - General Plumbing Provisions

C. Section 22 0100 - Basic Plumbing Materials, Methods and Identification

1.2 SUMMARY

A. This Section includes soil and non-process waste, sanitary, vent, condensate, rainwater leaders and, storm drainage piping inside the buildings and to a point 5'-0" outside of buildings unless otherwise indicated or shown. Connect to civil drawings and coordinate with site contractor.

1.3 SUBMITTALS

A. Field quality-control test reports.

B. Shop Drawings.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.

B. Transition Couplings for Underground Pressure Piping: AWWA C 219 metal, sleeve-type coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

C. Hubless Pipe and Fittings: ASTM A 888 or CISPI 301. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe

Institution and be listed by NSF International. 1. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion resistant fasteners, and rubber sleeve with integral, center pipe stop.

1. Aboveground Standard - Shielded, Stainless Steel Couplings: CISPI 310 with stainless steel corrugated shield; stainless steel banks and tightening devices and ASTM C 564, rubber sleeve and bear the NSF Trademark.

    a. Manufacturers: ANACO, Mission Rubber Co. and Tyler Pipe - Soil Pipe Div.

2. Underground Pipe - Heavy-Duty, Shielded, Stainless Steel Couplings: With stainless steel shield, stainless-steel bands and tightening devices and ASTM C 564, rubber sleeve.

    a. Manufacturers: ANACO/Husky SD 4000 and Clamp-All Corp.-125.

D. Steel Pipe: ASTM A 53, Schedule 40, galvanized. Include ends matching joining method.

1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53 or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.

2. Malleable-Iron Unions: ASME B 16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.

3. Cast-Iron, Threaded, Drainage Fittings: ASME B 16.12, galvanized.

4. Gray-Iron, Threaded Fittings: ASME B 16.4, Class 125, galvanized, standard pattern.

5. Cast-Iron Flanges: ASME B 16.1, Class 125.

6. Cast-Iron, Flanged Fittings: ASME B 16.1, Class 125, galvanized.

E. Copper DWV Tube: ASTM B-306, drainage tube, drawn temper.

1. Copper Drainage Fittings: ASME B 16.23, cast copper or ASME B 16.29, wrought copper, solder-joint fittings.

PART 3 – EXECUTION

3.1 GENERAL

A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.

C. Underground, Soil, Waste, Storm Drainage and Vent Piping: Use any of the following piping materials for each size range:

1. NPS 2 to NPS 6: Hubless, cast-iron soil piping and fittings.

2. NPS 1-1/2" and smaller: Copper DWV tube, copper drainage fittings, and lead-free soldered joints.

D. Condensate drains shall be DMV tube OR TYPE M.

3.2 PIPING INSTALLATION

A. Refer to Division 33 for project-site piping.

B. Refer to Section 22 0100 - Basic Plumbing Materials, Methods, and Identification for basic piping installation.

C. Install cleanouts at grade and extend to where building drains connect to building sewers. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.

D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Section 22 0100 - Basic Plumbing Materials, Methods, and Identification for sleeves and mechanical sleeve seals.

E. Install cast-iron soil piping according to CISPI's 'Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Encase underground piping with PE film according to ASTM A 674 or AWWA C 105.

2. US Pipe polyethylene encasement or approved equal.

F. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees

and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

G. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturers written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

H. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.

2. Horizontal Drainage Piping: 2 percent downward in direction of flow.

3. Vent Piping: Level.

I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

J. The contractor shall furnish and install all condensate piping with trap/vent for all heating and ventilating and/or mechanical equipment where required. Included is connection to the equipment (verified with mechanical contractor) and installation of the condensate drain to a code approved receptor. When condensate drains are installed on the roof, supports shall be MIFAB C-port CIOSS spaced every 6 feet.

1.5 JOINT CONSTRUCTION

A. Refer to Section 220100 -Basic Plumbing Materials, Methods, and Identification for basic piping joint construction.

B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter N, "Installation of Cast Iron Soil Pipe and Fittings."

1. Hubless Joints: Make with rubber gasket and sleeve or clamp.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

1.6 VALVE INSTALLATION

A. Refer to Section 220523 - Valves for general-duty valves.

B. Backwater Valves: Install backwater valves in piping subject to sewage backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type, unless otherwise indicated.

2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.

3. Install backwater valves in accessible locations.

4. Refer to Section 22 0500 - Plumbing Specialties for backwater valves.

1.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Section 22 0529 - Hangers, Supports, Mechanical Vibration, and Seismic Controls - Plumbing for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.

2. Individual, Straight, Horizontal Piping Runs: According to the following-

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer than 100 feet MSS Type 43, adjustable roller hangers.

c. Longer than 100 feet, if indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Section 22 0529 - Hangers, Supports, Mechanical Vibration, and Seismic Controls - Plumbing.

C. Support vertical piping and tubing at base and at each floor.

1.8 CONNECTIONS

A. Connect soil, waste, and storm drain piping to exterior sewage piping. Use transition fitting to join dissimilar piping materials.

B. Connect storm drainage piping to roof drains and storm drainage specialties.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Section 22 4000 - Plumbing Fixtures.

2. Plumbing Fixtures and Equipment Connect atmospheric vent piping in sizes indicated, but not smaller than required by UPC.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Section 22 0500 - Plumbing Specialties.

4. Equipment Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

1.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made and/or as required by Division 1. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

2. Prepare reports for tests and required corrective action.

1.10 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION

SECTION 22-4000 PLUMBING FIXTURES

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.

B. Section 22 0000 - General Plumbing Provisions

C. Section 22 0100 - Plumbing Materials, Methods and Identification

1.2 SUMMARY

A. Provide plumbing fixtures approved for water conservation and for accessibility regulations.

B. Provide complete fixture assemble, including all trim and appurtenances for proper operation and neat, finished appearance. Procure all rough-in data from manufacturer and rough-in and connect to fixtures as required.

1.3 QUALITY ASSURANCE

A. Contractor Qualifications: All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture. Supply all equipment and accessories new, free from defects. All items of a given type shall be the product of the same manufacturer.

B. Requirements of Regulatory Agencies:

1. In all cases where CS, ANSI, NSF or other standards are indicated or required, products shall meet or exceed the standards established for material, quality, manufacture, and performance.

2. Fixtures and trim designated for accessibility shall have prior approval of the applicable sections of the California Administrative Code prior to submissions of Shop Drawings and Product Data. The submission shall contain proof of the required State approvals.

3. General Requirements:

a. Coordinate height of accessible fixtures with those indicated in construction drawings.

b. Refer to drawings and fixture schedule at the end of this section for manufacturer and model numbers for plumbing fixtures.

c. Covers for cold and hot water and drainpipes under accessible sinks and lavatories. (CBC 11B-309.4)

4. Conform to DSA Bulletin BU-09-10 regarding installation of "LEAD FREE" plumbing fixtures, fittings and pipes.

C. Reference Standards:

1. ANSI - American National Standards Institute.

2. ASSE - American Society of Sanitary Engineers.

3. CS - Commercial Standards, Commodity Standards Division, U.S. Department of Commerce.

4. NSF - National Sanitation Foundation.

1.4 SUBMITTALS

A. Drawings and Product Data: See Division I and Section 220000 - General Plumbing Provisions for requirements and include the following

1. Descriptive Data:

a. Plumbing fixtures.

b. Plumbing fixture supplies.

c. Fixture supports.

2. Shop Drawings:

a. Fixture backing.

b. Rough-in Drawings.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Shop equipment in its original package, to prevent damage or entrance of foreign matter. Perform all handling and shipping in accordance with manufacturers recommendations. Provide protective coverings during conversation.

PART 2 - PRODUCTS

A. ACCEPTABLE MANUFACTURERS

Manufacturers:

1. Fixtures: American Standard, Kohler or Crane.

2. Fixture Trim: Refer to Plumbing Fixture Connection Schedule on drawings.

3. Flush Valves: Refer to Plumbing Fixture Connection Schedule on drawings.

4. Water Closet Seats: Church, Sperzel, or Beneke.

5. Carriers:

   a. Water Closets: Zurn ZN-1203 narrow series or Smith, unless otherwise noted or shown on drawings.

   b. Urinals: Zurn 1222 narrow series or Smith, unless otherwise noted or shown on drawings.

   c. Lavatories: Zurn 1231 series.

B. Fixture Supplies and Stops:

1. Lavatories: Speedway CRSST-1912-A, or approved substitute.

2. Sinks: Speedway CRSST-1912-K, or approved substitute.

3. Valves: Lockshield key operated stops.

4. Wall mounted faucets: Screwdriver stops or faucets may have integral stops in lieu of separate stops.

C. Fixture Flow Controls: To comply with Title 24 at each fixture as follows:

1. Water Closet 1.28 gpm.

2. Urinals: 0.13 gpf (quart).

3. Lavatories: 0.35 gpm.

4. Sinks: 1.5gpm.

D. Lavatory and Sink Traps: 17 gauge adjustable 'P traps, tubing to wall. Polished chrome plated.

E. Fixture Color: White.

F. Trim Finish: Polished chrome plated.

G. Plumbing Fixtures: Refer to Schedule on drawings. 1. Accessibility Compliant Requirements:

a. All designated fixtures for accessibility shall be installed per California Code of Regulations, Title 24, Part 2, accessibility compliant requirements.

b. Wrap P-Trap, cold and hot water tubing and stops with TRUEBRO to protect against scalding and scraping. Refer to drawings.

H. Other Materials:

1. All other materials not specifically described but required for a complete and proper installation shall be new, first quality of their respective kinds, and subject to the approval of the Architect.

1.6 MATERIALS

A. General:

1. Provide fixtures and trim complete for proper installation as described in the manufacturer's catalog with the modifications as shown on Plumbing Fixture Schedule.

2. All fixtures, specified to be of vitreous ware, shall be of a quality known commercially as "twice fired" vitreous chinaware of the best quality, nonabsorbent, burned so that the whole mass is thoroughly fused and vitrified, producing a material white in color which, when fractured, will show a homogeneous mass, close-grained and free from pores. The glazed and vitreous china fixtures shall be white, thoroughly fused and united to the body, without discoloration, chips, or flaws and shall be free from cracks. Warped or otherwise imperfect fixtures will not be acceptable.

3. Factory grind back and bases of fixtures smooth.

4. Enamel ware to be white cast iron with acid-resisting enamel.

5. Unless otherwise specified, water closets to have a waste passage to pass a 2-1/2 inch ball minimum. Bolt water closets to flanges with a 1 inch thick rubber foam gasket.

6. Fixture trim and exposed metal items shall be polished chrome-plated unless otherwise noted, and pipes passing through walls shall have polished chrome-plated escutcheon plates. All stainless steel shall be satin brushed (US32D) finish unless noted otherwise.

7. Fixtures shall be free from imperfections, true as to line, angles, curves, and color; smooth, watertight and practically noiseless in operation.

8. Exposed Pipe, Trim Including Fittings, Traps, Escutcheons, Valves, Valve Handles, and Accessories; Above and below fixtures:

   a. Polished chrome plated CF brass.

   b. Set-screw cast brass escutcheons for piping.

   c. Traps: Cast brass with cleanout plugs.

9. Supply fixtures with:

   a. Renewable seats or replaceable internal units.

   b. Compositional washers.

   c. All metal indexed handles.

   d. Screwdriver or lockshield stops.

B. Plumbing Fixtures Schedule: As shown on drawings.

1.7 ELECTRIC DOMESTIC WATER HEATERS

A. HOT WATER HEATER: A.O. Smith ProMax compact electric hot water heater Model EJC-10 with 6kw 240V element; or approved equal. Provide seismic strapping system, Pressure and Temperature Valve and Sheet metal pan with drain.

B. POINT-OF-USE: Under Classroom Sinks: A.O. Smith EJC-2 with 1500 watt 120V element, 7 gallons per hour recovery, or approved equal.

C. Water heaters shall be U.L. listed and be equipped with an anode rod. Each element shall be controlled by an individual thermostat and contain a high temperature cut-off switch. Tanks shall have 5 year warranties.

Fixture schedule

S-3 LAVATORY SINK - COUNTER MOUNT - Police Station	
Fixture:	Just Model OLR-1619k-2861 lavatory with angle stops and P-trap.
Just faucet JV-1139-A-W4, 0.5 GPM flow control, J-15-FS drain. Chicago mixing valve, grid drain. Provide trubro inc. hand-lav guard insulation kit for cold and hot water supplies and "p" trap	
Rough-in:	Existing - Verify in Field
	1/2" Cold water, 1/2" Hot water, 2" Waist, 1 1/2" Vent

PART 3 - EXECUTION

1.8 INSTALLATION

A. Plumbing Fixtures:

1. Install fixtures as recommended by the fixture manufacturer except as shown differently on Drawings or where required by handicap codes.

2. Set fixtures level and equally spaced when installed in bank of more than two.

3. Rough-in supplies level, equally spaced and symmetrical with the fixture.

4. Rough-in wastes in alignment with the fixture drain. Install flush valves level with flush connections vertically. Offsetting and misalignment will not be acceptable.

5. Caulk all deck mounted trim at the time of assembly, including fixture and casework mounted. Caulk all self-rimming sinks installed in casework. The butted space between fixtures and the wall, counter or floor on which they are mounted shall be sealed with white acrylic plastic caulking compound.

6. Point up fixtures at joints with walls and floors with nonhardening Tile-Fix.

7. Cover exposed fixture fastening nuts and bolts with china bolt caps. Fill with putty.

8. Make-up trim with care and with the proper tools in order that no tool marks show after installation.

B. Water Supplies:

1. Provide each water supply to each fixture, equipment or faucet, with a stop in the branch connecting thereto. The stop shall be a screwdriver partition stop at finished wall locations and a rough brass globe valve at rough locations. Angle stops for deck mounted faucets shall have an IFS inlet.

2. Cover unoccupied fixture faucet holes with faucet hole covers.

3. Securely fasten screwed adapter fittings behind water supply stub-outs to the structure.

C. Waste Outlets: Caulk strainers set in sanitary waste fixtures with glazing putty.

D. Supports:

1. Support wall-hung sinks and lavatories by concealed chair carriers, commercial type, with block feet and thrust nuts. Securely anchor the carrier to the structure.

2. Bolt chair carrier foot anchors and rear lugs to floor.

3. Coordinate wall dimensions required.

1.9 SPECIAL EQUIPMENT

A. General: Rough-in and connect to all special equipment specified in other Divisions or furnished by Owner.

B. Trim:

1. Provide pipe extension pieces, couplings, flanges, unions, cocks, valves, 'P' traps, pressure reducing valves, vents, wastes and all other trim required for proper operation which are not furnished integral with special equipment

1.10 ADJUSTMENT AND CLEANING

A. In accordance with the requirements of Sections 22 0000 - General Plumbing.

END OF SECTION

SECTION 23-0000 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 GENERAL

A. The General Requirements are hereby a part of this Section as fully as if repeated herein.

1.2 COORDINATION

A. Before submitting a bid for the mechanical work, the Contractor shall visit the site and become familiar with all work on other related Drawings and Specifications and plan the work to provide the best possible assembly of the combined work of all trades. No additional costs will be considered for work that has to be relocated due to conflicts with other trades.

1.3 BUILDING LAWS

A. Mechanical work shall conform to all requirements prescribed by governmental bodies having jurisdiction. The work shall be in accordance with the latest edition of the California Building Code, California Plumbing Code, California Mechanical Code, NBFU, NFPA and California State Code Title 8, Title 21, Title 24 Energy Conservation Standards and CALgreen and all local requirements by Mendocino County and City of Laytonville.

B. Should any part of the design fail to comply with such requirements, the discrepancy shall be called to the attention of the Engineer prior to submitting bid.

C. Should there be any direct conflict between the Drawings and/or Specifications the above rules and regulations shall take precedence. However, when the indicated material, workmanship, arrangement or construction is of a superior quality or capacity to that required by above rules and regulations, the Drawings and/or Specifications shall take precedence. Rulings and interpretations of enforcing agencies shall be considered as part of the regulations.

D. After a Contract is awarded, if minor changes or additions are required by the aforementioned authorities, even though such work is not shown on Drawings or overtly covered in the Specifications, they must be included at the Contractor's expense.

E. The Contractor is responsible to coordinate and make adjustments in his work with the full set of Contract Drawings and Specifications.

F. All piping, ducts and equipment shall be securely anchored to building structure as required herein and by the California Building Code to resist vertical and seismic forces.

G. Refer to SMACNA's SEISMIC RESTAINT MANUAL for seismic bracing of pipes and ductwork.

1.4 PERMITS, FEES AND UTILITIES

A. The Contractor shall obtain and arrange for all required permits and inspections.

1.5 MATERIALS

A. All materials used shall be new as listed in subheadings, except existing equipment noted for reuse and indicated on Drawings. Inspect all materials and immediately remove defective materials from the site.

B. Substitutions

1. No substitute materials or equipment may be installed without the written approval of the Owner or Engineer. see Section 01-6100 product substitutions.

2. Use of substitute materials or equipment may require changes in associated materials and equipment. Contractor shall be responsible for all costs and changes in Electrical, Structural and Mechanical work caused by substitute materials and equipment.

1.6 SUBMITTALS

A. See section 01-3300 for submittal procedures.

B. The review of submittals and approval thereof by the Engineer does not relieve the Contractor from compliance with the contract documents.

C. List of the items of material and equipment which the Contractor proposes to use shall be submitted with six copies or .pdf electronic document.

PART 2 - EXECUTION

A. Mechanical Drawings are Diagrammatic and are intended to show the approximate location of equipment and piping. Dimensions given on the Plans in figures shall take precedence over scaled dimensions. The Contractor shall verify all dimensions and equipment in the field.

B. The exact location of apparatus, equipment and piping shall be ascertained in the field and work shall be laid out accordingly. Should the Contractor fail to

ascertain such locations, the work shall be changed at Contractor's own expense when so ordered by the Owner. The Engineer reserves the right to make minor changes in the location of piping and equipment up to the time of installation without additional cost.

C. It is the intention of the Drawings and Specifications that, where certain mechanical items such as unions, expansion joints and other mechanical components are not shown, but where such items are required by the nature of the work, they shall be furnished and installed.

2.2 DAMAGE

A. Repair any damage to the building, premises and/or equipment caused by the work under this Section.

B. Repair all damage to any part of the building or premises caused by leaks or breaks in pipe, or malfunctions of equipment furnished or installed under this Section, until the warranty period expiration date.

2.3 COMPLETE WORKING INSTALLATION

A. The Drawings and Specifications do not undertake to list every item that must be installed. When an item is necessary for the satisfactory operation of the equipment, or is required by the equipment manufacturer, or good practice, furnish without change in Contract cost.

2.4 QUALITY OF WORK

A. The quality of work shall be of a standard generally accepted by SMACNA, ASME and NATE in the respective trade. Use experienced, competent and properly equipped workers. Replace work falling below this standard as directed by the Engineer.

B. Systems shall be worked into a complete and integrated arrangement with like elements arranged to make a neat appearing and finished piece of work with adequate head room and passageway free from obstructions.

2.5 ELECTRICAL REQUIREMENTS - CONTROLS AND COORDINATION WITH ELECTRICAL CONTRACTOR

A. Mechanical Contractor shall coordinate with the Electrical Contractor on furnishing and installing of controls, motors, starters, etc. Coordinate means informing Electrical Contractor of items requiring electrical connection, providing copies of submittal data, installation data, scheduling work to insure efficient progress and promptly supplying those items to be installed by Electrical Contractor.

2.6 CUTTING AND REPAIRING

A. No cutting shall be done except with Engineer's approval. Cutting of structural members or footings is prohibited without the prior written consent of the Structural Engineer.

2.7 SUPPORTS

A. All equipment, plenums, piping and ductwork shall be mounted on or suspended from foundations and supports as specified and indicated and seismically braced to structure.

2.8 TESTING

Test refrigerant piping to 300 psig for 24 hours with dry nitrogen. Notify inspection authorities prior to the test so that they may be witnessed.

2.9 MANUFACTURER'S DIRECTIONS

Materials and equipment shall be installed in accordance with manufacturer's application and recommendations, requirements and instructions, and in accordance with Contract Documents. Where manufacturer's instructions differ from those indicated or specified, they shall be brought to Engineer's attention for resolution prior to equipment ordering and installation.

2.10 CLEAN-UP

A. During the course of work under this Section, all rubbish, debris, surplus materials, tools and the like resulting from this work shall be removed from work area and shall be disposed of off-site. All steel, cardboard and wood shall be recycled. The Owner's premises shall be left clean and in a condition acceptable to the Engineer and Owner at project completion.

B. Replace construction filters with new filters prior to project completion.

C. Cover ends of open ductwork with plastic duct wrap at the end of each work period or when local construction activities create a lot of dust to keep the inside of the ductwork and equipment clean.

2.11 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

A. Furnish and install plastic laminated engraved nameplates with 1/4" minimum lettering for motor control devices, Heat Pumps, HVAC units, Exhaust Fans, Fan coils and Condensing Units.

2.12 GUARANTEE

A. The Contractor shall guarantee the quality of all work and the quality of equipment and materials for one year in accordance with the provisions of the General Conditions and Special Conditions. Should any defects occur during

this period, the Contractor shall promptly repair or replace defective items as by the Engineer, without cost to the Owner.

2.13 OPERATING AND MAINTENANCE MANUALS

A. Two (2) complete sets of bound instructions and one electronic .pdf file containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Owner.

END OF SECTION

SECTION 23-0100 - HEATING VENTILATION AND AIR CONDITIONING

PART 1 - GENERAL

1.1 THE GENERAL CONDITIONS AND BASIC MECHANICAL AND MATERIALS AND METHODS ARE HEREBY A PART OF THIS SECTION AS FULLY AS IF REPEATED HEREIN.

1.2 SCOPE OF WORK

POLICE FACILITY

A. Demolish, recycle and dispose of the existing HVAC systems consisting of two 15 ton gas-electric packaged rooftops. Selectively demolish and replace zone dampers with manual dampers in sleeves and ductwork per plans. Seal off ductwork not slated for reuse and unable to be removed.

B. Furnish and install two complete rooftop HVAC systems consisting two rooftop gas-heat with electric cool units designed for curb mounting.

C. Furnish and install split system heat pumps, condensing units, fan coils, ceiling cassettes, branch distribution boxes, refrigeration fittings and fan coils. Total number of systems determined by Base Bid and Additive Bids. Systems to include refrigeration piping, controls, new thermostats, ductwork, gas piping, power, condensate piping on the roof and insulated condensate piping for above the ceiling and at fan coils, condensate pumps and all accessories for complete, efficient and functional systems.

D. Provide system start-up, submit start-up sheet for each unit, As-built drawings, maintenance manuals, warranty and instruction.

1.3 SUBMITTALS

A. Submit for review five (5) copies of a complete list of materials proposed for installation (or pdf file), accompanied by manufacturer's data sheets giving sizes, capacities, etc. See General Conditions for requirements. Such list shall include the following:

1. Packaged Gas-Electric Units.
2. Heat Pumps or Condensers.
3. Fan coils and Ceiling Cassettes.
4. Condensate Pumps.
5. Air Outlets.

6. Control Equipment.

1.4 SEISMIC

A. Seismic restraints for all equipment, piping and ductwork shall be provided and installed by the Contractor per the California State Mechanical Code.

PART 2 - PRODUCTS

A. As specified in other Sections in Division 23

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Coordinate location and routing of equipment, control equipment, ductwork, piping, wiring and conduit with other trades, prior to installation.

B. Coordinate penetrations with other trades skilled in making the necessary holes and possible reinforcing. Do not cut, drill or notch structural members unless directed by a detail specific to the areas requiring penetrations.

C. Coordinate structural requirements for mechanical equipment with other trades: Concrete bases, wood platforms, blocking. Provide submittal and installation documents and provide field layout.

D. Coordinate plumbing and electrical requirements: provide submittal and installation documents and provide field layout.

E. Request inspections in writing for any parts of the system that will covered up by backfill or other trades a minimum of 48 hours prior to close-in of that part of the system.

F. Provide access or access panels for all equipment behind walls or above hard ceilings.

G. Note all changes and discrepancies on As-built drawings.

3.2 EQUIPMENT

A. Install equipment for easy access and serviceability. Provide adequate space for service and replacement. Install equipment level and plumb and provide all necessary hardware for anchorage and seismic requirements. Use only galvanized or stainless steel hardware on exterior applications.

B. Follow manufacturer’s recommendations for equipment start up. Provide factory start up for selected equipment, as specified.

C. Check for loose bolts and screws at start up. Locate and isolate vibrational sources: balance wheels as needed for smooth rotations

D. See related sections:

23 0713	Duct Insulation
23 0900	HVAC Controls
23 2123	Condensate Pumps
23 3700	Air Terminal Units
23 8000	HVAC Equipment

3.3 DUCTWORK - see Section 23 3100

3.4 REFRIGERANT PIPING – Section 23 300 and 23 0719 Pipe Insulation

3.5 FINISH AND PAINTING

A. Equipment not provided with a factory coating shall be cleaned and primed ready for painting by others, under other Sections.

B. Prime and paint louver or grille interiors where visible with flat black paint.

C. Provide factory off-white finish or mill finish as standard for air outlets. Provide prime-painted grilles, registers and louvers where required by Architect for field painting under other Sections.

END OF SECTION

SECTION 23-0529 - HVAC - HANGERS SUPPORTS, MECHANICAL VIBRATION AND SEISMIC CONTROLS

PART 1 - GENERAL

A. Furnish all labor, materials, and equipment and perform all operations required to complete piping, equipment and ductwork hanging and supports as indicated on the drawings and specified herein.

B. Related work specified elsewhere:

1. Section 23-0000 - Basic Mechanical Materials and Methods

2. Section 23-0100 - Heating, Ventilation and Air Conditioning

PART 2 - PRODUCTS

2.1 HANGERS

A. The duct hanging system is composed of three elements, the upper attachment to the building, the hanger itself, and the lower attachment to the duct. The manufacturer's load ratings should be followed for all devices and materials.

B. Provide hangers and attachments per SMACNA "DUCT CONSTRUCTION STANDARDS" and per the California Mechanical Code, provide the more stringent requirements.

2.2 FASTENERS

A. Concrete: Concrete anchors (Red Head) with 3" of minimum embedment. See Structural Drawings for specific requirements.

B. Wood: Lag screws with a minimum of 3" of embedment.

C. Metal: Self tapping #10 sheet metal screws or Grade 5 bolts

2.3 SUPPORTS

A. B-Line Dura-Blok rooftop supports

B. B-Line 12 ga Framing Channel with slots

PART 3 - EXECUTION

3.1 INSTALLATION

A. Predrill all holes for concrete and wood anchors.

B. The upper attachment to wood members for ductwork shall be with a #12 x 2" wood screw.

C. The hangars shall be 1" x 20 ga sheet metal straps.

D. The lower attachment will consist of the sheet metal strap encircling the ductwork and connected with #10 sheet metal screws at 10"o.c. to the ductwork and (2) #10 sheet metal screws at the top connecting the ductwork saddle to the hanger.

E. Horizontal spacing of duct hangers shall not exceed 10 feet for rigid metal ductwork. Provide hangers at 4 ft. intervals for flexible ductwork.

F. Vertical spacing of the duct hangers shall not exceed 12 feet.

G. Provide pipe covering protection between hangers and pipe insulation.

H. Copper pipe shall be insulated from metal hangers with plastic bushings.

I. Spacings:

1. Copper Pipe: 6 ft. up to 1-1/4", 8 ft for pipe 1-1/2" to 2".

2. Steel Pipe: 6 ft. up to 1", 8 ft for pipe 1-1/4" to 1-1/2".

3. Flexible Duct: 4 ft all sizes

4. Sheet metal duct: 10 ft horizontal, within 2 ft of fittings

3.2 VIBRATION

A. Secure all equipment to avoid the transfer of rotating energy to the structure. Provide flexible connectors and isolators where indicated or needed.

3.3 SEISMIC

A. Equipment installed shall be constructed and anchored to structural supports to resist a seismic force of 100% of the equipment's vertical weight in any other direction.

1. Equipment manufacturer's shall construct and certify that the equipment meets seismic requirements and submit calculations prepared by a state licensed structural engineer.

END OF SECTION

SECTION 23-0593 - TESTING ADJUSTING AND BALANCING OF HVAC

PART 1 - GENERAL

Air Balancing shall be performed in accordance with NEBB, SMACNA or AABC procedures. The contractor shall be independent and experienced in the balancing of air systems.

1.1 DESCRIPTION

A. Work included:

1. Air balancing of new and existing HVAC systems installed in the building.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division I of these Specifications.

C. Definitions are as indicated in applicable publications of AABC, ASHRAE, and ANSI.

1.2 QUALITY ASSURANCE

A. Qualifications of personnel:

1. Obtain the services of a qualified testing agency to the approval of the Architect.

B. NEBB or AABC membership or equal certifying organization.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01-3300.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit name of the proposed agency to the Architect for review.

C. Submit a balancing protocol for approval. Agency shall provide a report of the operation of all new equipment affected by this project. Equipment shall include the fan coils and exhaust fans. Air Balancing shall include all supply, return and exhaust air outlets.

D. Preliminary report: Review the pertinent Drawings and Specifications prior to installation of the affected systems, and submit a report to the Architect

stating whether any deficiencies exist in the system which would preclude proper adjusting, balancing, and testing of the systems.

1.4 TOLERANCES

A. Balancing tolerances shall be +/- 10% for airflow.

PART 2 - PRODUCTS

A. Report in electronic pdf format with results from tests and plan indicating location of tested devices.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Progress inspections:

1. Make sufficient inspections during progress of air and hydronic systems installation to verify that essential components are installed in a manner to permit optimum balancing.

2. Make written report to the Architect following each inspection.

3.2 PROCEDURES AND INSTRUMENTS

A. Adjust systems and components to perform as required by the Drawings and Specifications.

B. Test duration:

1. Conduct operating tests of heating and cooling fans, coils, and other equipment for not less than four hours after stabilized operating conditions have been established.

2. Base the capacities on temperatures and air/water quantities measured during such tests.

C. Instrumentation calibration:

1. Use accurate instruments for measurements, and make the calibration histories of each instrument available for examination.

2. Have each test instrument calibrated by an approved laboratory or by the manufacturer.

3.3 AIR SYSTEM PROCEDURES

A. Adjustment:

1. Adjust air handling systems to provide the required design air quantity to, or through, each component.

B. Adjust equalizing devices to provide uniform velocity across the inlets (duct side of supply) of terminals prior to measuring flow rates.

C. Balance:

1. Use only flow adjusting (volume control) devices to balance air quantities.

2. Proportion flow between various terminals comprising the system, to the extent that their adjustments do not create objectionable air motion or sound in excess of limits acceptable to the Mechanical Engineer.

3. Accomplish balancing between runs by use of flow regulating devices at or in the divided-flow fitting.

D. Flow restrictions:

1. Impose minimal restriction by flow regulating devices in or at terminals.

2. Make final measurements of air quantity after the air terminal has been adjusted to provide optimum air patterns of diffusion.

E. Fan adjustment:

1. Vary the total air system quantities by adjustment of fan speed.

2. Provide sheave and belt replacements as

F. Use air measuring systems, where installed, to measure the applicable air flows required therein.

G. Traverses:

1. Except as specifically indicated herein, make pitot tube traverses of each main duct to measure the total air flow therein.

H. Exceptions to traverses:

1. Pitot tube traverse may be omitted provided the duct serves only a single room or space and its design volume is less than 2000 cfm.

2. In lieu of pitot tube traverse, determine the air flow in the duct by totaling the volumes of the individual terminals served, measured as described herein.

I. Where diffuser, register, or grille design velocity and air quantity both are less than 1000 fpm/cfm, air quantity may be determined by measurement at respective diffusers, registers, or grilles served.

J. Air terminal, balancing:

1. Generally, measure flow rates by means of velocity meters applied to individual terminals, with or without cones or other adapters, only for balancing.

K. Air motion:

1. Provide air motion and distribution specified and indicated on the Drawings.

3.4 HEATING AND COOLING SYSTEM PROCEDURES

A. General:

1. Adjust heating and cooling systems to provide required quantity to, or through, each component.

2. Measure quantities and pressures with calibrated meters.

3. Use electronic flow hoods, orifices, manometers or other metering fittings and pressure gages to measure flow rates and to balance systems

B. Identify in the reports each item not complying with the Contract requirements, or obvious mal-operation or design deficiencies of equipment or controls.

END OF SECTION

SECTION 23-0713 - DUCT INSULATIION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, and equipment and perform all operations required to complete Duct insulation or liner as indicated on the drawings and specified herein.

B. Related work specified elsewhere:

1.	Section 23-0000	Basic Mechanical Materials and Methods
2.	23-0100	Heating, Ventilation and Air Conditioning
3.	23-0529	HVAC -Hangers Supports Mechanical Vibration and Seismic Controls

1.2 REFERENCES

A. American Society for Testing of Materials (ASTM):

ASTM C1136, ASTM C1290, ASTM C1338 and ASTM E84

B. Underwriters Laboratories (UL): UL723

C. National Fire Protection Association (NFPA): NFPA 90A & 90B.

1.3 SUBMITTALS

A. Submit performance criteria and installation instructions for each type of indicated product and sealants. Submit statement of VOC content of sealants.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

A. Owens-Corning

B. John Mansfield

C. or approved equal

2.2 DUCT INSULATION SYSTEM

A. Shall be Owens-Corning 1-1/2" Type 100 FRK, Manville R-6 Microlite Type FSK or approved equal, faced fiberglass ductwrap, 1" approximate installed thickness for interior ductwork.

B. Acoustic duct liner shall be R-6 Owens-Corning, Aeroflex or DuctLiner Board, Manville Linacoustic or approved equal. Fasten with glue and pins at NAIMA recommended spacing.

C. All ducts exposed in non-conditioned space or outdoors shall be lined with 2" or R-8 minimum Mansville Linacoustic Duct Liner.

PART 3 - EXECUTION

A. Visually inspect all joints for proper sealing. Contact inspector a minimum of 48 hours prior to insulating duct for inspection and/or as required for a duct leakage test. Verify duct is clean and dry prior to installation.

B. Install duct wrap with facing to the outside so that the tape flap overlaps the insulation and the other end of the duct wrap. Tightly butt adjacent sections of duct wrap insulation with the 2 inch stapling and taping flap overlapping. Staple seams approximately 6 inch on center with ½ inch steel outward clinching staples.

C. Seal seams of joints with pressure sensitive tape matching the insulation facing. Tightly butt adjacent sections of duct wrap with the 2 inch tape flap overlapping.

D. Install Duct Liner with with a black pigmented coating on the airstream side, to resist damage during installation and in service. Factory coat edges with the same coating, to comply with SMACNA HVAC DCS. Completely cover the duct designated to receive duct liner. Provide adequate protection for workers: disposable respirators, gloves, eye protection, etc.

E. Secure liner to duct with adhesive and weld-secured or impact driven mechanical fasteners.

F. Space mechanical fasteners in accordance with SMACNA HVAC DCS. Maximum spacing for mechanical fasteners shall be as follows:

1. Velocity = 0 to 2,500 feet per minute (0 to 12.8 m/s):
   a. From transverse end of liner: 3 in (75mm)
   b. Across width of duct: 12 in (300mm) O.C.
   c. From corners of duct: 4 in (100mm)
   d. Along length of duct: 18 in (450mm) O.C.

3.1 INSPECTION

A. Visually inspect duct insulation for proper installation.

B. Replace damaged insulation, which cannot be satisfactorily repaired, including insulation that is saturated with moisture.

END OF SECTION

SECTION 23-0719 - REFRIGERANT PIPING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, and equipment and perform all operations required to complete pipe insulation as indicated on the drawings and specified herein.

B. Related work specified elsewhere:

1. Section 23-0000 - Basic Mechanical Materials and Methods

2. 23-0100 Heating, Ventilation and Air Conditioning

3. 23-0529 HVAC -Hangers Supports Mechanical Vibration and Seismic Controls

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

1. Product data: Within 75 calendar days after the Contractor has received the Owner's Notice to Proceed, submit: Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements; pipe insulation and performance, adhesives, tapes and coverings.

1.3 REFERENCES: ASTM C 534 Type 1 – Tubular grade 1

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Armacell: AC Accoflex with ½” wall thickness

B. Gelcopper: PDM

2.2 INSULATION

A. Suction and discharge piping shall be insulated with ½” wall thickness of closed cell foam insulation with built-in vapor retardant barrier.

B. Insulate accessories with Parker refrigeration insulation tape with an adhesive.

PART 3 - EXECUTION

A. Materials shall be installed in accordance with the recommendations of the manufacturer. Insulation shall be sealed at edges and ends with adhesive to provide an airtight installation. Insulation at joint shall not be applied until tests specified in other Sections of these Specifications are completed.

B. Clean all dirt, dust, oil and water from pipework. Tubing shall be insulated by slipping the tubular insulation section over the pipe prior to joining. Joints shall have the insulation slipped over or slit and installed after testing. Seams and butt joints shall be sealed with contact adhesive Armaflex 520. The alternative is to use pipe insulation with self adhesive strip and adhesive on the butt ends.

C. Inspect and seal any exposed piping or fittings with insulation tape.

END OF SECTION

SECTION 23-0900 - HVAC INSTRUMENTATION AND CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Temperature controls for air conditioning, heating, and ventilating systems as indicated. Work includes, but is not be limited to, the following:

1. Automatic control valves and automatically operated dampers.

2. Pneumatic or electric relays (magnetic starters excluded), electric or mechanical linkages, duct sensors, thermostats, dampers and motorized valves, and appurtenances and accessories.

3. Wiring outlet boxes and conduits for control systems, including wiring to connect magnetic starters to control systems.

5. Testing and adjusting temperature control system.

6. Furnishing record drawings and operational data of systems as installed and finally adjusted.

7. Formal instruction of Owner personnel in operation of equipment.

B. Following items are specified in other Sections:

1. Magnetic starters, contacts, power relays and variable resistors or controllers for motors, and other electrical devices.

2. Load carrying wiring for above listed devices and wiring for starting switches not interconnected with temperature control system. (Division 26: Electrical).

3. Electrical power to control panels and other equipment. (Division 26: Electrical).

4. Installing automatic valves in pipelines.

5. Installing automatic dampers.

6. Automatic controls and valves not connected with comfort heating, ventilating, and air conditioning systems.

7. Packaged self contained equipment specified complete with temperature controls.

C. Related Requirements:

1. Division 01: General Requirements.

2. Division 26: Electrical.

4. Section 23 0000 Basic Mechanical Materials and Methods.

17. Section 23 0100: Heating, Ventilating and Air conditioning

18. Section 23 3100: Ductwork and Accessories

1.02 SUBMITTALS

A. Provide in accordance with Division 01 and Section 23 0000: Basic Mechanical Materials and Methods.

1. Complete list of items proposed to be furnished and installed under this Section.

2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.

3. Manufacturer's printed installation procedures.

B. Shop Drawings: Provide Shop Drawings, in the same size as the Drawings, prepared in Autocad or similar program and submitted in pdf format. Shop Drawings shall indicate temperature control diagrams, complete with equipment appurtenances required for system. Include sequence of operation description for each system. Submit in accordance with Division 01.

C. Sequence of Operation: Provide complete, detailed, step-by-step sequence of operation for each item of equipment.

D. Operating Instructions: Comply with provisions of Section 23 0000: Basic Mechanical Materials and Methods and Section 23 0100: Heating, Ventilating and Air conditioning. Explain and demonstrate operation of system to Owner representatives as required.

E. Guarantee: Refer to Section 23 0100: Heating, Ventilating and Air conditioning

1.03 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications: Comply with provisions of Section 23 0000: Basic Mechanical Materials and Methods and Section 23 0100: Heating, Ventilating and Air conditioning.

1.04 PRODUCT HANDLING

A. Production, Replacement, Delivery and Storage: Comply with provisions of Section 23 0000: Basic Mechanical Materials and Methods and Section 23 0100: Heating, Ventilating and Air conditioning.

PART 2 – PRODUCTS

2.01 TEMPERATURE CONTROLS

A. Provide temperature controls of electric, electronic microprocessor - DDC type, or a combination thereof, as indicated on Drawings, to provide required sequences or operational control.

2.02 MANUFACTURERS

A. Equipment in system shall be of same manufacturer or their standard furnished items. Testing, initial start-up, and adjusting of control system shall be under continuous observation of the controls engineer responsible for Shop Drawing preparation.

B. Pneumatic, electric, electronic, or direct digital microprocessor based control equipment shall be one of following manufacturers, unless otherwise noted:

1. Trane.

2. Honeywell or Johnson.

3. Venstar.

C. Economizer Control System:

1. Economizer controller shall consist of either a single instrument or a number of components, as indicated on reviewed submittals, to provide performance characteristics described.

2. When air handling equipment is started, a signal shall be provided to switch on economizer control system.

3. Unless overridden by a warm-up cycle signal, center shall, upon verification that air handling unit is running, open outside air damper to

provide minimum required ventilation. An adjustment shall be provided for minimum outside air setting.

4. A cooling demand signal shall be furnished to economizer controller from other temperature controllers as indicated on Drawings. An adjustment shall be provided to override economy cycle upon either an outside air or, if indicated on Drawings, an enthalpy stimulus. The economizer shall react to this signal as follows:

   a. Outside air temperature or enthalpy above setting or economizer override. No benefit is derived from use of outside air for free cooling. Outside, return, and exhaust dampers shall be positioned for minimum ventilation. Cooling demand shall be satisfied by modulating chilled water valve or DX equipment as applicable.

   b. Outside air temperature above cooling demand controller set point but below economizer switch over. Outside, return, and exhaust dampers shall be positioned for maximum free cooling using outside air with shortfall capacity made up by modulating chilled water valve or DX cooling coil.

   c. Outside air temperature below cooling demand controller. Cooling demand shall be satisfied by modulating outside, return and exhaust dampers. Chilled water valve shall be closed to flow of water through coil (DX equipment off).

5. A target gage will indicate if system is operating on economy cycle or has been switched to minimum ventilation.

6. An indicator shall be provided indicating outside air temperature at which economy override occurs.

D. Relays and Signal Transmitters: Necessary relays and signal boosters shall be furnished to provide a full and operable system as required by sequence of operation.

E. Selector Switches, Two-Position and Hand-Off-Auto: For applications where signals need to be switched manually, selector switches shall be furnished. Nema 4X Switches shall be designed for panel face mounting with position graphics located behind a knob.

F. Gradual Switches: Gradual switches shall provide a proportional output signal that increases and decreases according to position of a knob. Device shall be designed for panel mounting and be provided with a graduated backplate.

G. Dampers: Modulating dampers shall be single or multiple blade type as required. Damper frames shall be constructed of 14 gage galvanized sheet metal and shall be furnished with flanges for duct mounting. Blade-to-blade linkage on each section shall be concealed within damper frame. Section linkage shall not be exposed to airstream. Damper blades shall not exceed 6 inches in width. Blades shall be corrugated type construction, fabricated from two sheets of 22 gage galvanized sheet steel, spot welded together. Blades shall be suitable for high velocity performance. Dampers furnished for outside, return, or exhaust air and those provided for zone mixing dampers shall be furnished with seals to provide tight shut-off along edges of blades. Seals shall be synthetic elastomer, spring stainless steel or combinations of both. Seals shall provide a tight closing, low leakage damper of less than one percent at 3 inches static pressure. Bearing shall be oil-impregnated sintered bronze or bearing grade nylon.

2.03 ELECTRIC EQUIPMENT AND ACCESSORIES

A. Electric control equipment and accessories include, but are not limited to, the following:

1. Electric control devices as indicated on Drawings and described herein, including thermostats, temperature controllers, valve and damper operators, switches, relays, and control panels for instruments as required to provide a complete and operable system.

2. Wiring and conduit, unless otherwise noted, or control systems including wiring required, to connect magnetic starters, specified in other sections, to control systems.

B. Room Thermostats:

1. Thermostats for unitary air conditioning units shall be as specified in Section 23 0100: Heating, Ventilating and Air Conditioning Equipment. Thermostats located on outside walls shall be installed on insulated backplates or as specified by unit manufacturer.

2. Provide the following room thermostats for each specific application as follows, where manufacturer’s thermostats are not specified: Venstar T8850 with wifi key.

C. Duct-Mounted Thermostats: Duct-mounted thermostats shall be modulating or 2-position as required to accomplish sequence of operation.

D. Valve and Damper Motors: Damper motors shall be furnished with oil-immersed gear trains and ample capacity to handle required loads under normal

operating conditions. Where indicated, spring return type motors are to be provided. Valve motors to be 2-position or proportional, spring return or non spring return.

E. Time Clocks: Time clock shall be solid-state digital electronic type capable of 28 on/off set points to be distributed through the week, complete with a day repeat feature, time and set points to be adjustable to nearest minute with a minimum on duration of one minute and a maximum of 7 days. UL Listed, enclosed in standard case NEMA Type 1, Intermatic, Tork, Paragon, or equal, with battery operated carry-over.

F. Wiring: Wiring in connection with control systems regardless of voltage, except power supply circuits, is part of the Work of this Section. Wiring shall comply with Division 26: Electrical.

PART 3 – EXECUTION

3.01 TEMPERATURE CONTROL SYSTEM INSTALLATION

A. Control system shall be installed in accordance with control manufacturer's instructions and reviewed Shop Drawings.

3.02 CONTROL PANELS OR CABINETS

A. Switches, clocks, temperature control instruments, and remote bulb thermometers, whose capillary tubes are less than 25 feet in length, shall be mounted in control panels with required wiring, piping, and tubing behind panel. Control panels shall be galvanized steel sheet metal, with light gray hammertone enamel finish, not lighter than 14 gage and 6" minimum depth. Control panels shall be UL Listed. Panels shall be attached to wall at locations indicated, or as required. Adjustable apparatus shall be provided with P-Touch, or equal, labels to indicate function. A clear space of 30 inches in front shall be maintained.

B. Control cabinets shall be provided with door locks. Door locks shall be the flush type, latched, 5/8 inch for metal door, keyed to a Corbin Cat. No. 60 key. Cabinet shall be prime coated and finish painted as specified in Section 09 9000: Painting and Coating. Cabinet shall be surface mounted.

3.03 ROOM THERMOSTAT

A. Room thermostats shall be wall mounted at a height of approximately 4 feet. Room thermostats are not permitted on outside walls, at marker boards, between shelving, in recesses or above heat producing equipment. Units shall be installed as close to edge of tack board as possible. Room thermostats shall

have electronic "locking" to minimize tampering. Thermostats shall be furnished with set point windows and integral thermometers and have wifi capability. Thermostats shall have 365 day programming as required. Thermostats shall be as specified on drawings.

3.04 COORDINATION

A. Coordinate this Work with other aspects of system balancing to obtain a complete operating mechanical system in accordance with design intent, including coordinating with balancing of the system.

B. Coordinate this Work with all aspects of alarm, fire alarm, and smoke detector, specified in Division 26: Electrical.

3.05 SEQUENCE OF OPERATION

A. Each system, pneumatic, electric, electronic, or direct digital control shall operate as graphically and described on Drawings and in accordance with reviewed sequence of operation.

3.06 CONTROL SYSTEM ADJUSTMENTS

A. Perform adjustments under operating conditions to provide sequence of operation for controls indicated. If required operating conditions cannot be obtained before Substantial Completion, due to outdoor seasonal temperatures, return to the Project site when requested by the Owner and readjust control system when outdoor temperatures will permit proper operating conditions. Start readjustment within seven calendar days after notification. Final settings of controls and pressure ranges indicated by gages shall be indicated on project record documents.

3.07 PROTECTION

A. Protect the Work of this Section until Substantial Completion.

3.08 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 23-2123 - CONDENSATE PUMPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Condensate pumps for liquid condensate service from cooling coils.

1.2 RELATED SECTIONS

A. Section 23 00 00: Basic Mechanical Materials and Methods.

B. Section 23 01 00: HVAC

C. Section 26 – Electrical specifications.

1.3 SUBMITTALS

A. Submit under provisions of Section 01: Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.

B. Installer Qualifications: Minimum 2 year experience installing similar products.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Handle materials to avoid damage.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY

A. Manufacturer shall provide a limited one year warranty from date of installation. Condensate pumps shall be guaranteed to be free from defects in workmanship or materials and to function satisfactorily, when properly installed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: REFCO, ASPEN and LITTLE GIANT.

B. Equal

2.2 CONDENSATE PUMPS - GENERAL

A. Condensate pumps shall be as scheduled from the REFCO or ASPEN Series Pumps.

B. Pumps shall be designed to collect and remove condensate from HVAC and related equipment while being mounted in a plenum space.

C. Pumps shall have been tested to UL 2043, Third Edition - Fire Test For Heat And Visible Smoke Release For Discrete Products And Their Accessories Installed In Air Handling Spaces. Test shall have yielded satisfactory results documenting that emissions are within the acceptable criteria defined by the National Fire Protection Agency.

D. No auxiliary containment shall be required to allow the pump to be used in plenum spaces.

2.3 LIQUID CONDENSATE SERVICE

A. Operation: Condensate removal pumps shall be designed to collect and automatically remove the water produced by an air conditioner evaporative coil and/or a gas-condensing furnace. The pump shall collect water in its integral reservoir. After enough water has collected, an internal float switch activates the pump and water "pump-out" begins. Once enough water has been evacuated from the reservoir, the pump automatically de-activates the water level begins the cycle again.

B. WALL FAN COILS Product: Refco Sahara.
   1. Pump shall be installed within fan coil condensate pan.
   2. An integral auxiliary safety switch shall be included.
   3. 115/230 dual voltage, thermally protected motor.
   4. Lift Performance:
      a. 65 ft.,vertical 3.17 gph.

b. 328 feet horizontal.
c. Less than 16 dba

C. DUCTED AND CASSETTE FAN COILS Product: ASPEN MAXI-ORANGE.
1. Pump shall be connected to condensate drain of fan ocil.
2. An integral auxiliary safety switch shall be included.
3. 115/230 dual voltage, thermally protected motor.
4. Lift Performance:
a. 50 ft.,vertical 2.0 gph.
b. Less than 33 dba
c. Install with foam insulation to reduce vibrational noises.

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.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

B. Plumbing Connections:
1. Connect a suitable drain line from the evaporator coil drain to the pump's inlet. Ensure a downward slope of the line in order to provide proper gravity drainage into the pump.
2. Connect the properly ¼” plastic tubing to the discharge port's check valve assembly. Do not run piping higher than 80% of the recommended lift for the pump. For proper drainage of the discharge line, any horizontal run should have a downward slope.

C. Electrical Connections:
1. All wiring to the pump shall conform to local electrical codes. In areas where local codes are non-existent, the National Electrical Code applies.
2. Run control wire to fan coil to stop operation of fan coil, when pump has failed.
3. Routing of wires inside pump is critical. Keep all wires inside the pump's electrical enclosure clear of floats and switch actuation arms.

3.4 FIELD QUALITY CONTROL

A. Pump Test: Check for proper pump function.
   1. Remove the drain line tubing from the pump inlet.
   2. Pour water into the pump's inlet until the pump turns on.
   3. Pump should evacuate water then turn off. It will leave about 3/4 inch (19 mm) of water in the tank after "pump-out" is complete.
   4. Reconnect the drain line tubing to the pump inlet.
   5. Avoid installations that allow the water to be siphoned out of the system.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 23-2300 REFRIGERANT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, and equipment and perform all operations required to complete refrigerant piping as indicated on the drawings and specified herein.

B. Related work specified elsewhere:

1. Section 23-0000 - Basic Mechanical Materials and Methods
2. 23-0100 Heating, Ventilation and Air Conditioning
3. 23-0719 HVAC Piping Insulation

PART 2 - PRODUCTS

2.1 MANUFACTURER:

A. Mueller

B. PDM

C. or approved equal

2.2 REFRIGERANT SYSTEM MATERIALS

A. Exposed and Outdoors: Copper ACR, sealed with nitrogen charge with wrought copper fittings per ANSI/ASME B16.22 (long radius type only). Provide cush clamp connections to framing channels, ½" thick Armaflex insulation and PVC sheet metal cover at exterior locations.

B. Fan Coil line Sets: Manufactured line sets with ½" Armaflex closed cell foam insulation, cleaned and charged with nitrogen. Provide "Cush" Clamp connections to framing channels and PVC cover at exterior locations.

C. Joints shall be Silver Brazed with Oxy-Acetylene torch and nitrogen purge. Brazing rod shall be Silvaloy 15 or equal. Joints at Ductless Heat pumps, Branch Boxes and fan coil shall be flare type.

D. Refrigerant 410A.

E. Flare fittings furnished by the unit manufacturer shall be used. All flares shall be checked with gauge and made with a tool designed for R410a line sets.

PART 3 - EXECUTION

A. Install piping in as short a run as possible with a minimum number of bends. And fittings.

B. Refrigerant pipe installation shall be in conformance with ANSI/ASHRAE 15-1976 and ANSI B31.5.

C. Pitch: All refrigerant piping shall be installed with sufficient pitch in proper direction to insure adequate oil return to compressors. Provide suction traps at base of all suction risers.

D. General: Pipe shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, allowing for proper head room.

E. Supports shall be attached only to structural framing members and be of materials to isolate the copper with plastic rings. Spacing shall be 6 ft on center.

F. Pipes shall have burrs removed by reaming and shall be installed to permit free expansion and contraction without damage to joints or hangers.

G. Changes in direction shall be made with fittings or with a bending tool.

H. Open ends of pipelines or equipment shall be properly capped or plugged during installation to keep dirt, moisture and other foreign material out of the system.

I. Joints in copper tubing shall be cut square, ends shall be reamed and all filings and dust wiped from interior of pipe. Joints in refrigerant lines shall be brazed with "Silphos" brazing rod with a minimum melting point of 800F. A continuous flow of dry nitrogen shall be bled through tubing while being heated or brazed.

J. Test with nitrogen at 300 psig for 24 hours. Perform triple vac procedure for charging of units. Provide start-up log of pressures, weight of charge and degrees of sub-cooling and submit results with the Maintenance Manual.

K. Provide escutcheons at wall penetrations and seal up holes with insulation.

END OF SECTION

SECTION 23-3100 - DUCT WORK AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, and equipment and perform all operations required to complete installation as indicated on the drawings and specified herein.

B. All ductwork of sheet metal shall be in accordance with the applicable SMACNA Manual, unless otherwise specified, airtight and supported as recommended. Ductwork shall run concealed unless otherwise noted.

C. Related work specified elsewhere:

1. Section 23-0000 - Basic Mechanical Materials and Methods
2. Section 23-0100 - Heating, Ventilation and Air Conditioning
3. Section 23-0529 - HVAC-Hangers Supports Mechanical Vibration and Seismic Controls
4. Section 23-0713 - Duct Insulation

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for all ductwork systems and fittings in all buildings. Drawings scale shall be a minimum of 1/4 "=1'-0" and shall include but not be limited to:

1. Penetrations through walls, roofs, walls.
2. Duct accessories, including access doors and panels.
3. Special fittings.
4. Manual-volume damper indicating damper gauge, operator and operator stand-off.
5. Indicate all Fire-damper, smoke-damper, and combination fire- and smoke-damper installations, include sleeves and duct-mounting access doors.
6. Top and bottom of duct elevations.
7. Support methods.

B. Product data on all accessories.

1.3 QUALITY ASSURANCE

1. Manufacturer's Qualifications: Company specializing in manufacturing ductwork and fittings with a minimum of five years experience. Journeymen level work at institutional levels of quality.

2. Installer's Qualifications: Company specializing in installation of ductwork and fittings with a minimum of five years experience. Journeymen level work at institutional levels of quality.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers specified for products in Part 2 are subject to demonstrating compliance with requirements indicated herein.

1. United McGill
2. Omniduct
3. Casco
4. Cody West
5. Or approved equal

2.2 SHEET METAL MATERIALS

A. Duct Construction: Construction of ductwork shall be as follows:

1. Galvanized sheet steel of thickness recommended in Table 14 of the SMACNA HVAC Duct Construction Standards, 1985 Edition, for 2" water gauge 2500 feet per minute maximum velocity, except no ducts shall be less than 24-gauge. Fabricate in accordance with SMACNA Standards except where otherwise specified or indicated.

2. Rectangular Ductwork: Groove and Pittsburgh lock seams or Snap-lok shall be used for all low pressure rectangular longitudinal duct joints. End connections shall be S&Drive for rectangular ductwork up to 14" longest side. TDC or Ductmate flanged fittings shall be used for ductwork with sides greater tnan 14". All ductwork and fittings with the shortest side longer than 12" shall be work hardened by beading or cross-breaking.

3. Round ductwork shall be "Spiral" constructed per SMACNA tables for galvanized round duct with continuous locking seam.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A653/A653M, ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Stainless Steel: ASflvl A480/ A4801V1, Type 316.

D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 SEALANT MATERIALS

A. Joint and Seam Tape: 2 inches wide; foil tapes.

B. Tape Sealing System: Indoors: Polyken 339 Utility grade aluminum foil tape with synthetic rubber adhesive. Outdoors: Polyken 360 Butyl-Foil Sealant tape; 2' wide with 2mm of sealant.

C. Water-Based Joint and Seam Sealant Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts. Hardcast.

D. Solvent-Based Joint and Seam Sealant One-part, non-sag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

E. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type 5, Grade NS, Class 25, Use 0.

F. Flange Gaskets: Butyl rubber or EPDM polymer with poly-isobutylene plasticizer.

G. Manufacturers: 3M, Polyken, United McGill, Hardcast.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick

2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Hangers Installed in Corrosive Atmospheres: Electro-galvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation or stainless steel.

2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards—Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Galvanized-steel shapes and plates complying with ASTM A36/A36M.

E. Refer Section 23 0529 - Hangers, Supports, Mechanical Vibration and Seismic Control - HVAC.

2.5 RECTANGULAR METAL DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards—Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Rectangular ducts and fittings shall be constructed and installed per SMACNA 2” pressure class.

2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards—Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturers guidelines for material thickness, reinforcement size and spacing, and joint reinforcement

1. Manufacturers:

a. Ductmate Industries, Inc.

b. Nexus Inc.

c. Ward Industries, Inc.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards—Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.

1. Manufacturers:

a. Ductmate Industries, Inc.

b. Lockformer.

2. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.

3. Longitudinal Seams: Pittsburgh lock sealed with non-curing polymer sealant or snaplok with sealant.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of non-braced panel area unless ducts are lined.

2.6 ROUND/OVAL METAL DUCT FABRICATION

A. Round ducts and fittings shall be factory fabricated and installed as recommended by SMACNA Duct Manual, 2” pressure class.

B. Provide factory-fabricated spiral lockseam duct except as otherwise indicated. Factory-fabricated longitudinal seam is acceptable for ducts larger than standard or where air inlet or outlet sizes exceed the seam-to-seam dimension.

C. Factory-fabricated fittings shall be the same manufacturer as duct and the same material and construction of duct in which installed.

1. Tees: 45 degrees conical tap with centerline take-off unless otherwise indicated. Provide continuously welded seams.

2. Elbows: Mitered elbows shall have continuously welded seams and shall have 2 gores when less than 35 degrees, 3 gores when between 36 and 71 degrees, and 5 gores for more than 71 degrees.

3. For ducts die-stamped radius elbows are acceptable for ducts 8 inches and smaller in diameter, mitered elbows, as specified above, for ducts greater than 8 inches in diameter. Corrugated or flexible metal duct is unacceptable as are pleated elbows nor adjustable elbows

D. Manufacturers: United McGill, Semco, Metro.

2.7 FLEXIBLE DUCT

A. Flexible duct connectors at equipment shall be UL listed and rated for the environmental conditions expected at the usage location. Outdoor flexible connectors shall be rated for weather and sun exposure. Minimum length of flexible connector material shall be 4".

B. Flexible fiberglass ducting shall be UL Standard 181 flexible with R-6 minimum insulation thickness with metalized vapor barrier jacket and smooth interior liner.

1. Static pressure class up to 1 inch water gauge (250 pa).

2. Maximum working pressure 1 inch water gauge.

3. Nominal 1 inch insulation with vapor barrier.

4. Maximum thermal conductivity 0.27 Btuh per square foot per degree Fahrenheit per inch at 75 degree Fahrenheit

5. Use downstream of terminal units or at air distribution devices.

C. Static pressure class up to 10 inch water gauge (250 pa).

1. Maximum working pressure 10 inch water gauge.

2. Nominal 1-1/2 inch insulation with vapor barrier.

3. Maximum thermal conductivity 0.27 Btuh per square foot per degree Fahrenheit per inch at 75 degree Fahrenheit-

4. Use at inlet to variable or constant volume terminal units, sized to match terminal unit

D. Provide factory-installed collar.

E. Flexible ductwork clamps shall be adjustable screw type stainless steel straps approved for use with flexible ductwork

F. Manufacturers: Thermaflex, Casco, Cody/West

2.8 SINGLE BLADE DAMPERS

A. Dampers shall be job or factory fabricated of galvanized steel, two gauges heavier than duct and no longer than 12" x 48" reinforced or crimped for rigidity with pivot rod extending through duct. Provide duro-dyne levers with 1-1/2" stand-offs.

2.9 BACKDRAFT DAMPER

A. Manufacturers:

1. Air Balance, Inc.
2. Greenheck
3. Ruskin Company.

B. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

C. Frame: 0.052-inch-thick, galvanized sheet steel, with welded corners and mounting flange.

D. Blades: 0.050-inch-thick aluminum sheet

E. Blade Seals: Vinyl.

F. Blade Axles: Galvanized steel.

G. Tie Bars and Brackets: Galvanized steeL

H. Return Spring: Adjustable tension.

2.10 VOLUME DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. Duro dyne.
3. Ruskin Company.

B. General Description. Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

C. Standard Volume Dampers shall be multi-louver, opposed acting type in ducts over 12" with locking devices and quadrants. Damper blades shall not be over 6" wide; maximum unsupported blade length shall not exceed 42".Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with

flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.

2. Roll-Formed Steel Blades: 0.064-inch-thick, galvanized sheet steel.

3. Blade Axles: Galvanized steel.

4. Bearings: Oil-impregnated bronze.

5. Tie Bars and Brackets: Galvanized steel.

D. Dampers and volume extractors, including fastenings, shall be materials as specified for ducts, except that blades shall be two gauges heavier.

E. Jackshaft 1-inch-diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports, at each mullion and at each end of multiple-damper assemblies.

F. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.

G. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.11 FIRE DAMPERS

A. Manufacturers:

1. Air Balance

2. Philips

3. Ruskin Company

B. Fire dampers shall be labeled according to UL 555.

C. Fire Rating: 1-1/2 or 3 hours, based on application.

D. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inchthick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.

a. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

2. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 0.034-inch thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch thick, galvanized-steel blade connectors.

G. Horizontal Dampers: Include blade lock and stainless-steel closure spring

H. Fusible Links: Replaceable, 165°F rated.

2.12 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers:

1. Air Balance, Inc.

2. Philips

3. Ruskin Company

B. General Description: Labeled according to UL 555S. Combination fire and smoke dampers shall be labeled according to UL 555 for 1-1/2-hour rating. CSFM listed

C. Frame and Blades: 0.064-inch-thick, galvanized sheet steel.

D. Mounting Sleeve: Factory-installed, 0.052-inch-thick, galvanized sheet steel; length to suit wall or floor application.

E. Damper Motors: Provide for modulating or two-position action.

1. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains

2. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf (min.) or as required by application.

3. Outdoor Motors and Motors in Outside-Air Intakes: Equip with 0-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40°F.

4. Non-spring Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and break-away torque rating of 300 in. x lbf (mm) or as required by application.

5. Electrical Connection: 115V, single phase, 60 Hz.

2.13 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

B. Manufactured Turning Vanes: Fabricate 1-1/2-inch- wide, single or double-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.

C. Manufacturers:

1. Ductmate Industries, Inc.

2. Duro Dyne Corp.

3. Ward Industries, Inc.

2.14 DUCT-MOUNTING ACCESS DOORS

A. General Description: Fabricate doors airtight and suitable for duct pressure class.

B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.

C. Manufacturers:

1. Ruskin.

2. Ductmate Industries, Inc.

3. Ventfabrics, Inc.

4. Ward Industries, Inc.

D. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

E. Provide number of hinges and locks as follows:

1. Less Than 12 Inches Square: Secure with two sash locks.

2. Up to 18 Inches Square: Two hinges and two sash locks.

3. Up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.

4. Sizes 24 by 48 Inches and Larger: One additional hinge.

F. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.

G. Manufacturers:

1. Ductmate Industries, Inc.

2. Flexmasr U.S.A., Inc.

H. Frame: Galvanized sheet steel, with spin-in notched frame.

I. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

J. Insulation: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.15 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Ductuiate Industries, Inc.

2. Duro Dyne Corp.

3. Ventiabrics, Inc.

4. Ward Industries, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd.

2. Tensile Strength: 480 lbf/ inch in the warp and 360 lbf/ inch in the filling.

3. Service Temperature: Minus 40°F to plus 200°F.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: 2-inch wg.

2. All Ducts (on the roof): 4-inch wg.

3. Return Ducts: 2-inch wg.

4. Exhaust Ducts: 2-inch wg.

B. All ducts shall be galvanized steel.

3.2 DUCT INSTALLATION-GENERAL

A. Erect all ductwork to dimensions indicated, straight and smooth on the inside with neatly finished joints lapped in direction of air travel. Properly brace and reinforce all ducts with steel angles or other members. All ductwork shall be of galvanized steel unless otherwise specified or indicated.

B. Install ductwork to clear all obstructions, preserve headroom and keep openings clear. Due to limited area in which ducts and other equipment must be installed, Contractor shall cooperate with other trades to best utilize available space.

C. Install supply ducts above return or exhaust ducts where possible; provide long straight duct drops to diffusers for proper diffuser performance or provide register boxes with turning vanes and acoustical lining.

D. Should it be found impractical to install any duct of the exact size given, a duct of a different shape but having the same air resistance shall be installed. These alternate duct sizes to be approved by the District prior to installation. Duct sizes given are internal sizes, net inside dimensions inside the linings.

E. All elbows 45 degrees or greater shall be full elbows (centerline radius equal to duct width) or shall have turning vanes.

F. Provide volume dampers capable of adjustments and of being locked into position in take-offs. Provide suitable access through insulation for

adjustment of dampers. Mark damper levers with dangling plastic safety tape to ease system TAB and commissioning.

G. All ducts shall be supported at maximum 10-foot centers with 1" x 20-gauge straps for sheet metal ducts. Seismic brace ductwork as indicated and per SMACNA manual. Attach straps to structure with minimum of two #12 x 12” screws, beam clamps with 3/8” rod, expansion anchors or powder driven fasteners.

H. Vertical ducts shall be supported by extending bracing angles to rest firmly on floors or shall be bolted to walls, columns or other construction.

I. Fabricate compression-type supports from cross-braced metal angles not smaller than that required for duct bracing. When roof-mounted, provide pitch pockets.

J. Duct Sealing

1. Ducts exposed to weather shall be completely weatherproof with outdoor Hardcast 1402 butyl foil tape over all joints and seams.

2. Seal joints and seams of interior ductwork air tight with Hardcast 321 duct sealer and foil tape.

K. Duct Insulation and Lining

1. All ductwork shall be insulated with fiberglass duct wrap unless otherwise specified.

2. Any exposed ductwork in conditioned space shall be without insulation. Fresh air and exhaust ducts shall not be insulated.

3. All exposed ducts for conditioned air in non-conditioned space or outdoors shall be lined with 2" (R-8) Linacoustic insulation.

4. Rectangular ductwork may be lined with acoustic liner in lieu of exterior duct wrap, provided that the same insulating value is maintained. Provide acoustic lining where indicated on Drawings.

L. Install ducts with fewest possible joints.

M. Fabricate changes in direction, both horizontal and vertical, to permit easy air flow.

N. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

O. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

P. Install ducts with a clearance of 1 inch, plus, if appropriate, allowance for insulation thickness.

Q. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

R. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

S. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

T. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

U. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and fire-stopping sealant Fire-stopping materials and installation methods are specified in Division 7- Fire-stopping.

V. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's 'Duct Cleanliness for New Construction.'

W. Support equipment and metal duct components and accessories independent of ducts.

X. Support terminal components separately.

Y. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

Z. Install concrete inserts before placing concrete.

AA. Install powder-actuated concrete fasteners after concrete is placed and completely cured. 1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4-inches thick.

BB. Prime and paint all exposed ductwork and finish with latex paint Coordinate color with Architect

3.3 DUCT INSTALLATION- METAL

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards—Metal and Flexible," unless otherwise indicated.

B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

C. Support vertical ducts at maximum intervals of 16 feet and at each floor.

D. Install couplings tight to duct wall surface with a minimum of projections into duct Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

E. Seal all joints and seams before external insulation is applied. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards—Metal and Flexible" for duct pressure class indicated.

F. Make connections to equipment with flexible connectors.

G. Comply with SMACNA's "HVAC Duct Construction Standards—Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.4 DUCT INSTALLATION - FLEXIBLE DUCT

A. Flexible ductwork shall be installed with no runs more than 7-feet and no more than 3 bends of 45 degrees maximum each. The usage is limited to final connection of air terminal devices.

B. Flexible duct shall be installed in fully extended condition, free of sags and kinks, using only minimum length required to make connection. Bends greater than 90 degrees are not allowed. Flexible duct shall be full size of branch. Any change of size to match terminal connection shall be made at terminal. Flexible duct shall be stretched out with bends of minimum two diameter radius of 90 degree bends. All connections to sheet metal ducts shall be sealed per section L above and secured with 3/8" nylon straps around inside liner of flexible duct, as manufactured by Panduit or Tyton.

C. Provide a single continuous piece.

D. Maximum length (unless indicated otherwise on drawings):

1. 1 inch water gauge - 5 feet

End Connections: Connect to duct collars, terminal unit connections, and round air outlets per manufacturer's instructions. Secure with strap clamps as specified above.

E. Installation: Support per SMACNA. Install as straight as possible. One 90 degree turn is permitted. Minimum bend radius to be two duct diameters.

F.

3.5 ACCESSORY INSTALLATION AND ADJUSTING

A. Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH-116.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

1. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

2. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.

C. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.

D. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" provide test holes at fan inlets and outlets and elsewhere as indicated.

E. Install fire and smoke dampers, with fusible links, according to manufacturer's UL-approved written instructions.

F. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

1. On both sides of duct heating or cooling coils.

2. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.

G. Install the following sizes for duct-mounting, rectangular access doors:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body Plus Ladder Access: 25 by 17 inches.

H. Install the following sizes for duct-mounting, round access doors:

1. One-Hand or Inspection Access: 8 inches in diameter.
2. Two-Hand Access: 10 inches in diameter.
3. Head and Hand Access: 12 inches in diameter.
4. Head and Shoulders Access: 18 inches in diameter.
5. Body Access: 24 inches in diameter.

I. Label access doors according to Section 23 0100 - Basic Mechanical Materials, Methods, and Identification.

J. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

K. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps

L. Connect flexible ducts to metal ducts with draw bands plus a sheet metal screw through the draw band at two points.

M. Install duct test holes where indicated and required for testing and balancing purposes.

N. Adjusting

1. Adjust duct accessories for proper settings.
2. Adjust fire and smoke dampers for proper action.

3. Final positioning of manual-volume dampers is as determined after testing, adjusting, and balancing.

END OF SECTION

SECTION 23-8000 - HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Air conditioning and air handling equipment including but not limited to:

1. Single Packaged Heating and Air Conditioning Units.
2. Split System Air Conditioning Units.
3. Split System Heat Pump Units.
4. Fans.

B. Related Requirements:

1. Division 01: General Requirements.
2. Section 07 6000: Flashing and Sheet Metal.
3. Section 22: Plumbing.
4. Section 23 0000: Basic HVAC Materials and Methods.
5. Section 23 0100: HVAC
6. Section 23 0900: HVAC Controls.
7. Section 26: Electrical

1.02 DESIGN REQUIREMENTS

A. Work of this Section is based on HVAC equipment units indicated as Basis of Design in Part 2 of this Section. Products from different HVAC equipment manufacturers listed are never identical, although equivalent in capacity, performance and quality. In the cases where dimensions, weight, configuration and utility requirements differ from the products used as a basis of design, the Contractor, at no additional cost to the Owner, shall coordinate and submit, for Architect review, revisions to the design.

1.03 SUBMITTALS

A. Provide in accordance with Division 01 and Section 23 0000: Basic HVAC Materials and Methods.

1.04 QUALITY ASSURANCE

A. Provide submittals in accordance with Section 23 0000: Basic HVAC Materials and Methods.

B. Minimum five years of experience installing similar projects for municipalities.

1.05 PROJECT RECORD DOCUMENTS

A. Provide Owner instructions on equipment operation and maintenance procedures, as indicated in Section 23 0000: Basic Mechanical Materials and Methods.

1.06 WARRANTY

A. Compressors shall be provided with manufacturer's five year warranty, (replacement only).

B. Manufacturer shall warrant parts for a period of one year.

C. One year parts and labor warranty by Contractor.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. Capacities of air conditioning equipment indicated on Drawings are net capacities actually required. Standard catalog ratings shall be adjusted to actual Project site environmental conditions.

2.02 AIR CONDITIONING UNITS – AC-1 and AC-2

A. Manufacturers: Trane, McQuay, AAON, or equal.

B. Furnish packaged air conditioning unit with gas heating for roof top installation. Unit shall be self-contained, completely factory assembled, with complete internal wiring and controls. Unit shall also be provided with a fully piped refrigerant circuit, fully charged with an environmentally friendly refrigerant that is not scheduled for phase out. Unit shall be field configurable for down-flow or horizontal discharge. Cooling and heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings. Provide a transition curb with seismic restraints for a lateral design force equal to the weight.

C. Quality Assurance:

1. Units shall be CSA certified for outdoor installation.

2. Cooling capacity shall be rated in accordance with current ANSI/AHRI Standard 210/240.

3. Unit shall be UL listed and designed to conform to ANSI/ASHRAE Standard 15 Safety Code for Mechanical Refrigeration and ANSI Z21.47/UL 1995 Heating and Cooling Equipment.

4. ANSI/NFPA 70: National Electrical Code.

5. Unit cooling efficiency EER/SEER ratings shall comply with CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.

6. Unit heating efficiencies AFUE ratings shall comply with current CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.

7. Unit shall comply with California Maximum Oxides of Nitrogen (NOX) Emission Regulations and current SCAQMD regulations.

8. The unit roof curbs shall conform to NRCA standards.

9. Insulation and adhesive shall meet NFPA 90A and 90B requirements for flame spread and smoke generation.

10. Unit casing shall be capable of withstanding ASTM B117 500-hour salt spray test.

11. Each unit shall be run tested at factory per ANSI/ASHRAE 37 and provided with a certificate indicating tested pressures, amperages, dates, and inspector.

12. Seismic restraints and anchors shall be factory designed.

D. Unit Cabinet:

1. Galvanized steel with baked enamel finish on external surfaces that are exposed to weather.

2. Interior surfaces exposed to conditioned and return air streams shall be insulated with a minimum ½-inch thick, 1 pound density foil-faced cleanable insulation. Insulation shall have an “R” Value of 3.70 and comply with material safety standards and installation requirements for duct lining as specified under Section 23 0700: HVAC Insulation.

3. Cabinet top cover shall be of one piece construction or where seams exist, shall be double hemmed and gasket sealed.

4. Cabinet panels shall be hinged access panels for filter, compressors, evaporator fan, control box and heat section areas. Each panel shall use multiple quarter-turn latches and handles. Each major external hinged access panel shall be permanently attached to rooftop unit. Panels shall also include tiebacks.

5. Return air filters shall be accessible through a hinged access panel and be on a slide-out track using standard size filters.

6. Holes shall be provided in base rails (minimum 16 gage) for rigging shackles and level travel and movement during overhead rigging operations.

7. Unit shall have a factory-installed internally sloped condensate drain pan, providing a minimum ¾-inch-14 NPT connection to prevent standing water from accumulating. Pan shall be fabricated of high impact polycarbonate material, epoxy powder coated steel or stainless steel and shall slide out for cleaning or maintenance. An alternate vertical drain (¾-inch NPT) connection shall also be available. Drain pans shall conform to ASHRAE 62 self-draining provisions.

E. Compressors:

1. Unit shall be furnished with single or multiple fully hermetic scroll compressors with internal vibration isolators.
2. Dual electrically and mechanically independent refrigerant circuits for 7.5 tons and above.
3. Compressors shall be provided with service access valves.
4. Compressor motors shall be cooled by refrigerant passing through motor windings.
5. Compressors shall be provided with line break thermal and current overload protection.
6. Compressors shall be provided with crankcase heaters, internal high-pressure and temperature protection.

F. Refrigerant circuit components:

1. Thermostatic expansion valve (TXV) with removable power element.
2. Refrigerant strainer.
3. Service gage connections on suction, discharge, and liquid lines.
4. Solid core refrigerant filter driers.

G. Evaporator and Condenser Coils: Standard Evaporator and condenser coils shall be furnished with:

1. Condenser coils Type A, B, or C is acceptable
   a. Type A: Copper-tube, aluminum-fin coil, with liquid subcooler. Internally enhanced 3/8 inch OD seamless copper tubing mechanically bonded to aluminum fins.
   b. Type B: Spine Fin condenser coil shall be continuously wrapped, corrosion resistant aluminum with minimum brazed joints. This coil is 3/8 inch OD seamless aluminum tubing glued to a continuous aluminum fin. Coils are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on four sides by louvered panels.
   c. Type-C: Coil shall be air-cooled Micro-Channel heat exchanger technology (MCHX) and shall have a series of flat

tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coils shall consist of a two-pass arrangement. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a factory applied corrosion-resistant coating.

2. Evaporator coils

   a. Aluminum plate fins mechanically bonded to enhanced copper tubes with joints brazed.

   b. Tube sheet openings shall be belled to prevent tube wear.

   c. Evaporator coil shall be of full-face active design.

   d. Dual circuit models shall have face-split type evaporator coil.

G. Evaporator and Condenser Coils at locations within two miles from ocean shall be furnished with copper plate fins mechanically bonded to enhanced copper tubes with copper tube sheets and brazed joints. Coated coils are not acceptable.

H. Fans and Motors:

1. Evaporator fan shall be a dynamically balanced, double width, double inlet, forward curved centrifugal type, fabricated of steel with a corrosion resistant finish that was tested and rated in accordance with AMCA requirements.

2. Evaporator fans shall be belt or direct-driven, as indicated on Drawings.

3. Direct drive fans shall be provided with minimum two speeds taps adjustment or ECM motor.

4. Evaporator blower and motor shall have permanently lubricated, factory-sealed ball bearings and automatic-reset thermal overload protection.

5. Belt drive shall include an adjustable-pitch motor pulley. Belt drive fans shall accommodate from 0.6 inch to 1.6-inch external static pressure without changing drives or motors.

6. Condenser fan shall be a dynamically balanced, propeller type, fabricated of aluminum blades riveted to corrosion resistant steel spiders and direct-driven by a totally enclosed motor. Condenser air shall be discharged vertically. Condenser fan motor shall be high efficiency or ECM type motor and provide cooling operation down to 25 degrees F outdoor temperature with automatic-reset thermal overload protection.

I. Heating Section:

1. Induced draft combustion type with energy saving direct spark ignition system, redundant main gas valve, and 2-stage heat.
2. The heat exchanger shall be of tubular section type fabricated of a minimum of 20 gage steel coated with a nominal 1.2 mil aluminum-silicone alloy or 20 gage type 409 stainless steel, including stainless steel tubes, vestibule plate.
3. Burners shall be of in-shot type fabricated of aluminum coated steel or stainless steel.
4. Gas piping shall enter unit cabinet at a single location.
5. Integrated Controls shall provide following:
   a. Timed control of evaporator fan functioning and burner ignition,
   b. Anti-cycle protection for gas heat operation (after one cycle on high temperature limit switch and one cycle on flame rollout switch).
   c. Diagnostic information.
6. Induced draft motor shall be provided with permanently lubricated, sealed bearings and inherent automatic reset thermal overload protection.

J. Controls, Safeties and Diagnostic Points:

1. Unit Controls: Unit shall be furnished with self-contained, network capable and ready direct digital controls.
   a. Controls shall be factory-installed.
   b. Controls shall operate with zone control systems.
   c. Controls shall furnish built-in diagnostics for thermostat commands for staged heating and cooling, evaporator-fan operation, and economizer operation.
   d. Controls shall be furnished with a 5-minute time delay between modes of operation.
   e. Control circuit shall protected by a fuse on 24-V transformer side.
2. Compressor high temperature, high current, internal overloads, internal thermostat.
   a. Compressor reverse rotation protection.
   b. Loss-of-charge/low-pressure switch.
   c. Freeze-protection thermostat, evaporator coil.
   d. High-pressure switch. The lockout protection shall be easily disconnected at control board, if necessary.

e. Internal relief valve.

f. Anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle.

3. Heating section shall be provided with following minimum protections:

a. High-temperature limit switches.

b. Induced draft motor speed sensor.

c. Flame rollout switch.

d. Flame proving controls.

e. Redundant main gas valve.

f. Heating controls shall consist of:

1) 1-stage automatic combination gas valve.

2) Pressure regulator.

3) Electric spark intermittent ignition system or hot surface ignition system.

4) Time delay fan control.

4. Operating Characteristics:

a. Unit shall be capable of starting and operating at 125 degrees F ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 360 at plus or minus 10 percent voltage.

b. Compressor with standard controls shall be capable of operation down to 25 degrees F ambient outdoor temperature.

5. Automated fault detection and diagnostics (FDD) for the economizers and other controls required by Title -24.

K. Filter Section:

1. Provide filter section with factory-installed low-velocity, throwaway 2-inch thick high capacity, MERV 8 Class 2, or equal, filters of commercially available sizes unless noted otherwise on the drawings.

2. Filter face velocity shall not exceed 300 fpm at nominal airflows.

3. Filter section shall allow installation of standard size air filter.

4. Return air filters shall be accessible through a hinged access panel and be on a slide-out track using standard size filters.

L. 100 Percent Outdoor Air Economizer:

1. Provide on units larger than 4 tons nominal capacity. Provide for smaller capacities where indicated on drawings.
2. Gear-driven integrated economizers.
3. Integrated integral-modulating type capable of simultaneous economizer and compressor operation.
4. Furnish hardware and controls to provide cooling with outdoor air.
5. Low-leakage dampers not to exceed 3 percent leakage, at one inch wg pressure differential (variable sliding economizer).
6. Barometric relief damper. Damper shall close upon unit shutoff.
7. Differential temperature and enthalpy controller unless indicated otherwise on drawings.
8. Base Rail: Factory installed on both horizontal and down-flow units.
9. Dampers Using Electronic Actuators:
    a. Manufacturer: Belimo, Honeywell, Invensys, Johnson Controls, or equal.
    b. Size for torque required for damper seal at load conditions.
    c. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle.
    d. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to prevent damage to the actuator during a stall condition.
    e. Fail-Safe Operation: Mechanical, spring-return mechanism.
    f. Power Requirements: Maximum of 10 VA at 24 VAC or 8 W at 24 VDC.
    g. Proportional Actuators shall be fully programmable. Control input, position feedback and running time shall be factor or field programmable by use of external computer software. Diagnostic feedback shall provide indications of hunting or oscillation, mechanical overload and mechanical travel. Programming shall be through EEPROM without the use of actuator mounted switches.
    h. Actuators shall be listed by ISO 9001, ULC, and CSA C22.2.

M. Furnish programmable digital thermostat with following features for single zone units that are not provided with variable volume and variable temperature type controls:

1. 365-day time clock.
2. Heat, cool, automatic changeover.

3. Occupied/unoccupied modes.

4. Dry contact switch for input from an external device such as a central time clock, occupancy sensor or a telephone activated device.

5. Remote sensors. School Areas that could be subject to vandalism or accidental impact damage such as Gymnasiums, Auditoriums, Multipurpose Rooms, Corridors, and Lobbies shall be provided with thermostats with remote return air duct or room sensors. Verify remote location of sensors and thermostats with Architect.

6. Robertshaw, Honeywell, Johnson Controls, or equal. Refer to Section 23 0900 for areas with zone damper controls.

2.03. FAN COIL UNITS, HEAT PUMPS AND CONDENSING UNITS

A. Manufacturer: Daiken, Mitsubishi, Fujitsu or equal.

B. FCU, HP & CU: Furnish fan coil unit (FCU), Heat Pump units and condensing unit (CU), split type, air-cooled, roof or ground for ducted connections or free blow. Units shall be air-cooled heat pump unit/direct expansion fan coil combinations. Condensing unit outdoor section shall be factory assembled with a direct-drive condenser fans with horizontal or vertical air discharge, scroll or swing type compressor, refrigerant coil, fan motors, pre-wired control panel and a holding charge of a non-ozone depleting refrigerant. Contractor shall provide additional refrigerant for extended lines. Indoor fan coil unit shall be furnished with horizontal discharge and will include evaporator coil, fan and motor, condensate pan with drain, thermal expansion valve, pre-wired control panel and remote thermostat control. Condensate pumps shall be added as needed to remove condensate from the building. Unit shall provide an EER/SEER complying with CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings. UL listed and rated at AHRI Standard 210/240 and have similar efficiency and capacity as compared with the scheduled equipment.

C. Nominal unit cooling, heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings.

D. Condenser coils

1. Condenser coils Type A, B, or C are acceptable.

a. Type A: Copper-tube, aluminum-fin coil, with liquid subcooler. Internally enhanced 3/8-inch outside diameter, seamless copper tubing mechanically bonded to aluminum fins.

b. Type B: Spine Fin™ condenser coil shall be continuously wrapped, corrosion resistant aluminum with minimum brazed joints. This coil is 3/8 inch outside diameter seamless aluminum tubing glued to a continuous aluminum fin. Coils

are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on four sides by louvered panels.

c. Type-C: Coil shall be air-cooled Micro-Channel heat exchanger technology (MCHX) and shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coils shall consist of a two-pass arrangement. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a factory applied corrosion-resistant coating.

E. Evaporator coils:

1. Aluminum plate fins mechanically bonded to enhanced copper tubes with joints brazed.

2. Tube sheet openings shall be belled to prevent tube wear.

3. Evaporator coil shall be of full-face active design.

4. Dual circuit models shall have face-split type evaporator coil.

F. Condenser Fan and Motors: Condenser fan shall be a dynamically balanced, propeller type, fabricated of aluminum blades riveted to corrosion resistant steel spiders and direct-driven by a totally enclosed motor. Condenser air shall be discharged horizontally or vertically. Condenser fan motors shall be high efficiency or ECM type motor.

G. Cabinets: Fabricated of galvanized steel, bonderized and finished with baked enamel.

H. Compressor shall be serviceable hermetic scroll type. Compressor shall be furnished with access valves and shall be installed on rubber isolators to reduce sound vibration. It shall be furnished with high and low-pressure protection. Each horizontal discharge condensing unit shall be furnished with a factory installed suction accumulator. Field installed accumulators are not permitted. It shall be furnished with high and low-pressure protection, brass external vapor supply line service valves, vapor return line service valves with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader-type fittings with brass caps, filter drier, pressure relief, liquid line solenoid valves, thermostatic expansion valves, and a holding charge of refrigerant.

I. Controls: Compressor motor assembly shall be protected with high and low-pressure switches, internal overloads, internal thermostat, internal relief valve, and anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle. Unit shall incorporate an automatic relay for indoor circulating air blower. Control panel shall be pre-wired in unit casing. The control circuit shall incorporate a manual reset safety circuit to render refrigerant system (compressor and outdoor air motor) inoperative should

there be a loss of airflow or refrigerant. Units shall also be furnished with automatic condenser-fan motor protection, high condensing temperature protection, compressor motor current and temperature overload protection, high pressure relief, and condenser fan failure protection.

K. Low Ambient Operation: Head pressure control shall be provided for operation at outside air temperature below 40 degrees F.

L. Filters: Filters shall be 2-inch standard size high capacity replaceable media type MERV 8, or equal, installed in an external 2-inch rack filter section and complete with an access door.

M. An in-line filter-drier shall be provided with equipment and shall be installed at Project site.

N. Economizer: Provide on 6.25 nominal ton and larger units only. Economizer shall be manufacturer's standard; factory furnished and field installed. Economizer control shall maintain a fixed supply air temperature during free cooling operation by providing full modulation of operable outside and return air dampers.

2.04. HEAT PUMP AND FAN COIL UNITS

A. Manufacturer: Daiken, Mitsubishi, Fujitsu or equal.

B. HP and matching indoor fan coil unit and condenser unit: Furnish heat pump, split type, air-cooled, roof or ground installation with ducted connections or free blow. Units shall be air-cooled heat pump/direct expansion fan coil combinations. Heat pump outdoor section shall be factory assembled and furnished with direct-drive condenser fans with horizontal or vertical air discharge, scroll type compressor, refrigerant coil, fan motors, pre-wired control panel. Unit shall also be provided with a fully piped refrigerant circuit, fully charged with an environmentally friendly refrigerant that is not scheduled for phase out. Provide additional refrigerant for extended lines. Indoor fan coil unit shall be furnished with horizontal discharge and will include evaporator coil, fan and motor, condensate pan with drain, thermal expansion valve, pre-wired control panel and remote thermostat control. Nominal unit cooling, heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings.

C. Quality Assurance:

1. Cooling capacity rated in accordance with current AHRI Standard 210/240 and 270. Units shall be listed in AHRI.

2. Unit construction shall comply with ANSI/ASHRAE 15, latest revision, and with NEC.

3. Units shall be constructed in accordance with UL standards and shall carry UL label of approval. Units shall have CSA approval.

4. Units shall be listed in CEC directory.

5. Unit cabinet shall be capable of withstanding ASTM B117 500 hour salt spray test.

6. Air-cooled condenser coils shall be leak tested at 217 psig and pressure tested at 450 psig with coil submerged water.

7. Unit shall provide an EER/SEER/COP complying with CCR, Title 24, Building Energy Efficiency Standards and per the drawings.

D. Evaporator and condenser coils: Evaporator and condenser coils shall be copper with mechanically bonded, smooth aluminum plate fins. Tube joints shall be brazed with copper or silver alloy. Coils shall be pressure-tested at factory.

E. Fans:

1. Condenser Fan and Motors: Condenser fan shall be high efficiency or ECM type motor direct driven, propeller type arranged for horizontal or vertical discharge. Condenser fan motors shall be furnished with inherent protection, and shall be permanently lubricated type, resiliently mounted for quiet operation. Each fan shall be furnished with a safety guard.

2. Evaporator fan section shall be furnished with high efficiency or ECM type motor centrifugal, forward curved, double width, double inlet fan or fans installed on a solid shaft. Fan shall be statically and dynamically balanced and shall rotate on permanently lubricated bearings.

F. Unit Cabinets:

1. Cabinets shall be fabricated of galvanized steel, bonderized and finished with baked enamel.

2. Cabinet interior shall be insulated with minimum one inch thick neoprene covered fiberglass.

3. Outdoor unit compartment shall be isolated and have an acoustic lining to assure quiet operation.

G. Compressor: Compressor shall be hermetic scroll type or hermetic swing type.

1. Compressor shall be furnished with access valves and it shall be installed on rubber isolators to reduce sound vibration.

2. Furnish with high and low-pressure protection.

3. Each heat pump shall be furnished with factory installed suction accumulator. Field installed accumulators are not permitted.

4. It shall be furnished with high and low-pressure protection, brass external vapor supply line service valves, vapor return line service valves with service gage connection port, service gage port

connections on compressor suction and discharge lines with Schrader-type fittings with brass caps, filter drier, pressure relief, liquid line solenoid valves, thermostatic expansion valves, and a holding charge of refrigerant.

H. Refrigeration Components: Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader type fittings with brass caps, accumulator or receiver, bi-flow filter drier, pressure relief, reversing valves, heating mode metering device, and a holding charge of refrigerant and crankcase heaters.

I. Controls and Safeties:

1. Compressor motor assembly shall be protected with high and low-pressure switches, internal overloads, internal thermostat, internal relief valve, and anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle.
2. Control panel shall be pre-wired in unit casing.
3. The control circuit shall incorporate a safety circuit to render refrigerant system (compressor and outdoor air motor) inoperative should there be a loss of airflow or refrigerant.
4. Units shall also be furnished with automatic condenser-fan motor protection, high condensing temperature protection, compressor motor current and temperature overload protection, high pressure relief and condenser fan failure protection.

J. Low Ambient Operation: Head pressure control shall be provided for operation at outside air temperature below 45 degrees F.

K. Safeties:

1. High condensing temperature protection.
2. Compressor motor current and temperature overload protection.
3. High pressure relief.
4. Outdoor fan failure protection.
5. Factory PCB diagnostics

L. Filters:

1. Filters shall be manufacturer’s standard.

M. Economizer: Not Applicable

N. Provide programmable digital thermostat with following features:

1. 7-day time clock.
2. Heat, cool, automatic changeover.
3. Occupied / Unoccupied modes.
5. Daiken ENVi, Venstar, or equal.
6. WIFI Capability

O. Start-up: Factory test each unit before shipment to Project site. Performance test shall include full refrigeration start-up, fan and controls start-up. Each unit shall be provided with its own report with its own serial number. Non-tested units are not permitted to be delivered to Project site. Provide full start-up of units to include full refrigeration and provide a written report.

P. Parts Availability: Submit proof in writing that majority (minimum 80 percent) of replacements parts are commonly available and not proprietary. Also, submit proof in writing that a local parts sales and service facility exists, where replacement parts will be warehoused in quantity. Guarantee timely availability for parts that are proprietary

PART 3 – EXECUTION

3.01 GENERAL

A. Examine areas under which Work of this Section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 EQUIPMENT FOUNDATIONS

A. Provide foundations (housekeeping pads, level platforms, adaptor curbs or curbs) for mechanical equipment whether indicated on drawings or not. Equipment foundations shall be of sufficient size and weight, and of proper design to preclude shifting of equipment under operating conditions, or under abnormal conditions imposed upon equipment ie: seismic event.

3.03 EQUIPMENT DESIGN AND INSTALLATION

A. Uniformity: Unless otherwise specified, equipment of same type or classification shall be product of same manufacturer.

B. Application: Only provide equipment as reviewed by Architect.

C. Equipment Installation: Equipment installation shall be in strict accordance with these Specifications, and installation instructions of manufacturers. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on equipment. Flanged joints shall be adequately extended before installation. Piping shall be graded, anchored, guided and supported, without low pockets.

1. Install equipment in a neat and skillful manner, properly aligned, leveled, and adjusted for satisfactory operation.

2. Install so connecting and disconnecting of piping and accessories can be readily accomplished, parts are readily accessible for inspection, service and repair. Space shall be provided to readily remove filters, coils, compressors and fan wheels. Access doors shall be hinged with cam lock door handles.

3. Provide flexible connections for duct, pipe and conduit connections at moving equipment.

3.04 ROOF-TOP EQUIPMENT MOUNTING

A. Downflow Packaged Units: Install unit on a prefabricated mounting frame or curb secured directly to roof. Follow manufacturers recommended installation manuals. Submit Shop Drawings for review by Architect.

B. Horizontal Flow Packaged Units: Install unit on platform or prefabricated mounting frame or curb secured directly to roof designed to suit roof conditions and requirements of provided unit. Submit Shop Drawings for review by Architect.

3.05 NOISE AND VIBRATION

A. Operation of Equipment: Mechanical equipment and piping systems shall operate without exceeding specified noise and/or vibration levels.

B. Corrective Measures: If specified noise and/or vibration levels are exceeded, provide necessary changes to reduce noise and/or vibration levels to within specified levels.

3.06 FIELD TESTS AND INSPECTION

A. General: Perform field inspections, field tests, and trial operations as specified in Section 23 0100: HVAC. Provide labor, equipment and incidentals required for testing.

B. Equipment and Material: Equipment and material certified as being successfully tested by manufacturer, in accordance with referenced Specifications and standards, will not require re-testing before installation. Equipment and materials not tested at place of manufacture will be tested before or after installation, as applicable or necessary, to determine compliance with reference Specifications and standards.

C. Start-Up and Operational Test: System shall be started up and initially operated with components operating. During this test, various strainers or filters shall be periodically cleaned until no further accumulation of foreign material occurs. Adjust safety and automatic control instruments as required to provide proper operation and control.

D. Extent of Field Tests: After installation and before completion, Work of this Section shall be subjected to required field tests, including those specified here and in Section 23 0500: Common Work Results for HVAC.

E. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 230000: Basic Mechanical Materials and Methods

3.07 REFRIGERANT PIPING

A. Unless otherwise indicated, main liquid and suction lines from condensing unit to evaporator coil shall be of sizes specified by manufacturer.

B. Refrigeration piping shall be refrigeration grade copper tubing, type L hard-drawn. In instances where refrigeration lines are installed in an inaccessible location and must be snaked through conduit or a trench, that portion of tubing required to complete connections through conduit or trench may be soft drawn. Maintain entire system clean and dry during installation. Pipe shall be sealed until installed. Use Factory Line Sets with factory flares and insulation between Branch Boxes and fan coils.

C. Refrigeration piping, both hard and soft-drawn, shall be straight and free from kinks, restrictions and horizontal runs shall be sloped towards compressor one inch to 10 feet wherever possible. Vapor line oil traps shall be installed on bottom of vertical risers and inverted oil trap shall be installed on top of vertical risers.

D. Joints shall be installed with Sil-Fos 15, Silvaloy 15, or equal, high melting point solder.

E. Flare nuts required on suction lines shall be of short forged or frost-proof type. Other fittings shall be standard sweat-soldered type. Ells and return bends shall be long radius type. Install leak lock material.

F. Refrigeration Piping: Joints shall be silver brazed and leak tested. Field fabricated lines shall be thoroughly flushed and cleaned before connection. Bleed nitrogen through lines during silver brazing, and cap and seal lines when not completed and connected to equipment.

G. Sleeve penetrations of floors, walls and ceiling to allow for free motion of piping. Provide 24 gage galvanized iron pipe and chrome-plated escutcheon plates. Pack annular space between pipe and sleeve with incombustible material such as fiberglass and seal each end with mastic to provide a waterproof seal.

H. Install insulated couplings at points of connection between dissimilar metals for cathodic protection. Insulate copper tubing from ferrous materials and hangers with 2-inch thickness of 3-inch wide strip, 10 mil polyvinyl tape wrapped around pipe.

I. Support piping by iron hangers and supports. Hydra-Zorb cushion clamps, LSP Products Group Acousto Clamp, or equal, on non-insulated piping, and Klo-Shure coupling clamp on insulated piping, or equal.

J. Provide saddles to protect pipe insulation.

K. Provide connections of copper and brass pipe and tubing with Harris Products Group Safety-Silv 56, Lucas-Milhoupt, Inc., or equal, complying with ANSI/AWS A5.8 and NSF 51.

M. On split heat pump systems, insulate both vapor and liquid lines. For insulation materials, refer to Section 23 0719: Pipe Insulation.

3.08 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

3.09 PROTECTION

A. Protect Work of this Section until Substantial Completion.

END OF SECTION

SECTION 26 0500
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the Electrical Work as shown on the drawings and as specified hereinafter, including, but not limited to the following:
   1. Demolition of existing air conditioning units on the roof.
   2. New power distribution as shown on the drawings.
   3. Branch circuit wiring, wiring devices and connections to all equipment requiring electrical service.
   4. All electrical work as indicated on the drawings.
   5. All required incidental work, such as testing, and temporary power.
   6. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
   7. It is the intent of the drawings and specifications that systems be complete and, except as otherwise noted, be ready for operation.

1.02 RELATED WORK

A. Division 1 - General Requirements

B. Firestopping.

1.03 INCORPORATED DOCUMENTS

A. Requirements of the General Conditions, Supplementary Conditions, and Division 1 Sections apply to all work in this Section, unless modified herein.

B. Published specifications, standard tests or recommended methods of trade, industry or government organizations apply to work of this Section where cited by abbreviations noted below, unless modified herein.
   1. National Electrical Code, latest edition (NEC).
   2. California Building Code, latest edition (UBC)
   3. California Energy Conservation Code (Title 24)
   4. Underwriters' Laboratories, Inc. (UL).
   5. Local Utility Company regulations.

C. All State and Municipal Codes and Ordinances.

1.04 CONDITIONS AT SITE:

A. Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.

B. Lines of other services that are damaged as a result of this work shall promptly be repaired at no expense to the Owner to the complete satisfaction of the Owner.

1.05 QUALITY ASSURANCE

A. Conformance:
1. All work shall conform to the applicable requirements of Article 1.03 above.
2. The Contractor shall notify the Architect, prior to submission of bid, about any part of the design which fails to comply with abovementioned requirements.
3. If after contract is awarded, minor changes and additions are required by aforementioned authorities, even though such work is not shown on drawings or covered in the specifications, they shall be included at Contractor's expense.

B. Coordination:
1. The Contractor shall become familiar with the conditions at the job site, and with the drawings and specifications and plan the installation of the electrical work to conform with the existing conditions and that shown and specified so as to provide the best possible assembly of the combined work of all trades.
2. The Contractor shall work out in advance all "tight" conditions, involving all trades and if found necessary, supplementary drawings shall be prepared by this Contractor, for the Engineer's approval, before work proceeds in these areas. No additional costs will be considered for work which must be relocated due to conflicts with the work of other trades.

1.06 SUBMITTALS

A. Product Data:
1. Comply with the provisions of Section 013300 - Submittals.
2. Within 15 days after award of the Contract, submit:
a. Complete material list of all items proposed to be furnished and installed under this Section, including but not limited to the following items: Circuit breakers, conduit, devices, enclosures, etc.
b. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
c. Manufacturers' recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.
3. Shop Drawings: Furnish shop drawings and/or equipment cuts for the following:
a. Electrical Panels
4. Test Reports:
a. Factory Tests: As specified for specific equipment.
b. Field Tests: Performance tests as specified for specific equipment.
c. Megger Tests: As specified under TESTING.
5. Maintenance and Operating Manuals:
a. Systems Description: Description of operating procedures.
b. Controls: Diagrams and description of operation of each system.
c. Equipment: Manufacturer's brochures, ratings, certified shop drawings, maintenance data, and parts lists with part numbers. Mark each sheet with equipment identification number and actual installed condition.
d. Materials and Accessories: Manufacturer's brochures, parts list with part numbers, and maintenance data where applicable. Mark each sheet with identification number of system and location of installation.
6. Record Documents:
a. "As-builts": As specified under Paragraph 3.02 of this SECTION.

1.07 DELIVERY, STORAGE AND HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all trades.

B. Delivery and Storage: Deliver all materials to the job site in their original containers with all labels intact and legible at time of use. Store in strict accordance with approved manufacturers' recommendations.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

D. This Contractor shall personally, or through an authorized representative, check all materials upon receipt at jobsite for conformance with approved shop drawings and/or plans and specifications.

1.08 SCHEDULING/SEQUENCING

A. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet the construction schedule, together with any special handling charges, shall be borne by this Contractor.

B. The Contractor shall coordinate production and delivery schedule for all Owner-supplied equipment with the equipment suppliers to ensure that all Owner-supplied equipment is delivered to site in coordination with the construction schedule and in such a manner as to cause no delays in completion of the Contract as scheduled.

1.09 REQUIREMENTS

A. The contract drawings indicate the extent and general arrangements of the conduit wiring systems, etc. If any departures from the contract drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable, and within thirty-five (35) days after award of the electrical contract.

B. UNLESS MATERIAL LIST AND DATA IS RECEIVED AS A COMPLETE AND ALL INCLUSIVE SUBMITTAL WITHIN THE STIPULATED TIME ALL ITEMS SHALL BE PROVIDED AS SPECIFIED -- WITH NO DEVIATIONS PERMITTED.

C. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether architectural, structural, plumbing, mechanical or electrical, shall be borne by the Contractor under this Section.

D. Burden of proof of equality of any substitution for a specified product is the responsibility of this Contractor.

E. Where required by Engineer to ascertain equality of substitute product, Contractor may be requested to provide the specified item and the submitted substitution for comparison, at no additional cost to the Owner.

1.10 SEISMIC RESTRAINTS

A. General: Provide seismic restraints per applicable code and as specified or indicated, and to meet the requirements of Seismic Design Category 4. Design restraints to prevent permanent displacement in any direction caused by lateral motion, overturning, or uplift.

B. Requirements:
1. Seismic Importance Factor: 1.25g.
2. Restraint: Required for following:
   a. Distribution Board
   b. Fire Alarm related enclosures and devices
   c. Transformers
   d. Cable Tray
   e. Cabinets

C. If restraint is required, design equipment to withstand the required seismic force criteria, including its internal design, components and frame, and suitable structural elements to which restraining attachments may be fastened.

D. Rigidly Supported Equipment: Restrain per SMACNA where applicable; where not applicable restrain similarly and as recommended by equipment manufacturer.

E. Design:
1. Prepare designs, including arrangements, sizes and model numbers indicated or referenced in applicable standards.
2. Where designs are neither indicated nor referenced, prepare such designs, together with supporting calculations prepared by a Structural Engineer registered in State of California.
3. For Distribution Boards, cable tray, and other equipment weighing 400 pounds or greater, the Contractor shall submit seismic calculations carried out by a structural engineer registered in the State of California.

F. Submittals:
1. Individual Restraint Devices: Submit manufacturer's data sheets or shop drawings for each device type and size. Indicate load ratings as published manufacturer's data or on shop drawings.
2. Restraint locations: Submit on shop drawings.
3. Design Calculations: As specified above under Paragraph 1.10.F.
4. Certification by Registered Structural Engineer, at completion of construction, that required seismic restraints have been properly installed to comply with Contract Documents and with applicable codes.

1.11 GUARANTEE

A. This Contractor shall guarantee that all work executed under this Section will be free from defects of materials and workmanship for a period of one (1) year or as per the General Conditions of this project, whichever is longer. Dates shall be from the date of final acceptance of the building. The contractor shall further guarantee that he will, at his own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the guarantee. Such repair or replacement shall be guaranteed for one (1) year from the date of repair or replacement.

1.12 PERMITS AND INSPECTIONS

A. This Contractor shall obtain and pay for all required permits and arrange for all inspections required.

B. Do not allow or cause any of the work to be covered or enclosed until it has been tested and/or inspected.

1.13 IDENTIFICATION

A. Switchboards Distribution Boards, feeder circuit breakers in switchboards, panels, cabinets, and other apparatus used for the operation of, or control of circuits, appliances or equipment, shall be properly identified by means of engraved laminated plastic descriptive nameplates mounted on apparatus using stainless steel screws. Nameplates shall have white letters with black background and be submitted to the Architect for approval. Cardholders in any form are not acceptable.

B. Provide identification of all pull boxes, junction boxes, and conduit stub-ups on the project as outlined below:
   1. For Power Feeders:
      a. Stencil cover with identifying circuit number.
      b. Lettering 1" high.
      c. Color of lettering black.
      d. Place lettering on cover in neat manner; run parallel to long sides of box.
   2. For branch circuits, grounding, communication, signal, and control systems boxes and blank conduit stub-outs:
      a. Paint inside back of each j-box, front of each cover, and ends of each blank conduit stub-out with identifying system color as listed below:

System	Color
277/480 volt	Orange
120/208 volt	Blue
Telephone/Data	Grey
Ground system	Green
Fire Alarm	Red
Media	Yellow
Security	White.

PART 2 - PRODUCTS

2.01 GENERAL

A. Refer to applicable Division 26 and Division 27 Sections for complete products specifications.

2.02 MATERIALS

A. Materials of the same type or classification, used for the same purpose, shall be the product of the same manufacturer.

2.03 ACCEPTABLE MANUFACTURERS

A. Materials shall be of make mentioned elsewhere in this specification. All materials shall be the best of their several kinds, perfectly new and approved by the Underwriters' Laboratories.

B. Where material, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of desired quality, style and utility and shall be the basis of the bid. Materials so specified shall be furnished under the contract unless changed by written approval of the Architect. Where two or more designations are listed, choice shall be optional with this Contractor, but this Contractor must submit his choice for final approval.

2.04 POSTED OPERATING INSTRUCTIONS

A. Furnish approved operating instructions for systems and equipment where indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof enclosures for operating instruction exposed to the weather. Operating instruction shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

2.05 CATALOGED PRODUCTS/SERVICE AVAILABILITY

A. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonable convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which the work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Drawings:

1. The general arrangement and location of wiring and equipment is shown on the electrical drawings and shall be installed in accordance therewith, except for minor changes required by conflict with the work of other trades.
2. All dimensions, together with locations of doors, partitions, etc. are to be taken from the Architectural Drawings, verified at site by this Contractor.
3. Maintain "as-built" records at all times, showing the exact location of concealed conduits and feeders installed under this contract, and actual numbering of each circuit. Upon completion of work and before acceptance can be considered, this Contractor must forward to Architect vellums (obtained from the Architect at cost) corrected to show the electrical work as installed.

B. Measurements: Before ordering any material or closing in any work, verify all measurements on the job. Any differences found between dimensions on the drawings and actual measurements shall be brought to the Engineer's attention for consideration before proceeding.

3.03 FIELD QUALITY CONTROL

A. All workmanship shall be first class and carried out in a manner satisfactory to and approved by the Architect.

B. This Contractor shall personally, or through an authorized and competent representative, constantly supervise the work and so far as possible keep the same foreman and workmen on the job throughout.

3.04 INSTALLATION/APPLICATION/ERECTION

A. All cutting, repairing and structural reinforcing for the installation of this work shall be done by the General Contractor in conformance with the Architect's requirements.

3.05 EARTHQUAKE RESISTANT INSTALLATION/FASTENING:

A. All electrical equipment and raceways shall be anchored to withstand forces generated by earthquake motions. As a minimum, equipment and equipment frames shall be designed to withstand a force of 25% of the weight of the equipment and frame acting at its center of gravity. Anchorage of the equipment and/or frame to the structure shall be for a force of 50% gravity also acting at the center of gravity.

B. For Distribution Board, and Cable Tray, the above values shall be doubled. Design stresses in either case may be increased 1/3 over normal allowable stresses but never beyond yield.

3.06 ADJUSTING AND CLEANING

A. All electrical equipment, including existing equipment not "finish painted" under other sections, shall be touched up where finished surface is marred or damaged.

B. All equipment, lighting fixtures, etc., shall be left in clean condition, with all shipping and otherwise unnecessary labels removed therefrom.

3.07 SCHEDULES

A. Coordination: Coordinate installation of electrical items with the schedule for other work to prevent unnecessary delays in the total Work.

3.08 WARNING SIGN MOUNTING

A. Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.09 PAINTING OF EQUIPMENT

A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test, except equipment specified to meet requirements of ANSI C37.20 shall have a finish as specified in ANSI C37.20.

B. Field Applied: Paint electrical equipment as required matching finish or meeting safety criteria. Painting shall be as specified in the respective equipment section.

3.10 TESTS

A. Testing and inspection: See Section 26 08 00 - Testing.

- END OF SECTION -

SECTION 26 0800
TESTING

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included in This Section: All materials, labor, equipment, services and incidentals necessary to perform the testing of the electrical work, including but not limited to the following:
   1. Grounding System.
   2. Distribution System.

B. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

C. All work shall comply with Divisions 26 05 00 and 26 27 00.

1.02 APPLICABLE CODES, STANDARDS, AND REFERENCES

A. All inspections and tests shall be in accordance with the International Electrical Testing Association - Acceptance Testing Specifications.

PART 2 - PRODUCTS

2.01 This article does not apply to testing.

PART 3 - EXECUTION

3.01 GENERAL

A. Final test and inspection to be conducted in presence of Engineer and Owner: the Contractor shall conduct at the expense of and Test at a mutually agreed time. Submit written test report.

B. The electrical installation shall be inspected and tested to ensure safety to building occupants, operating personnel, conformity to code authorities and Contract Documents.

3.02 INSPECTIONS AND TESTS

A. Tests: Field tests shall be performed and reports submitted, as per Section 26 05 00-3, Paragraph 1.06.A.4.
   1. Final Inspection Certificates: Prior to final payment approval, deliver to the Owner, with a copy to the Engineer, signed certificates of final inspection by the appropriate local authority having jurisdiction.

B. Grounding System:
   1. All ground connections shall be checked and the system shall be checked for continuity.
   2. Ground tests shall meet the requirements of the National Electric Code.

C. Power Distribution System:
   1. Tests: Test Distribution Board, and panelboards for grounds and shorts with mains disconnected from feeders, branch circuits connected and circuit breakers closed, all fixtures in place and permanently connected and grounding jumper to

neutral lifted and with all wall switches closed.

2. Test each individual circuit at each panelboard with equipment connected for proper operation. Inspect the interior of each panel.
3. Check verification of color coding, tagging, numbering, and splice make-up.
4. Verify that all conductors associated with each circuit are in same conduit.
5. Demonstrate that all lights, jacks, switches, outlets, and equipment operate satisfactorily and as called for.
6. Perform megger tests of all distribution system feeders.

- END OF SECTION -

SECTION 26 2400
SERVICE AND DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included in This Section: All materials, labor, equipment, services and incidentals necessary to install the electrical work as shown on the drawings and as specified hereinafter, including but not limited to the work listed below.

B. Service distribution conduits and cable where noted for power

C. Distribution system, grounding, and overcurrent protective devices.

D. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

E. All work shall comply with Sections 26 05 00 and 26 27 00.

1.02 RELATED WORK

A. Division 1– General Requirements

1.03 SUBMITTALS

A. Comply with the provisions of Section 26 05 00 - Submittals.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Refer to Section 26 05 00, Part 2 - Products

B. List of Equipment Manufacturers:
1. Switchboard and Distribution Equipment
Westinghouse/Cutler Hammer
General Electric
Industrial Electric Manufacturing
Electrical Power Products
Square D

2.02 MATERIALS

A. Grounding:
1.
2. Terminate conduits at equipment with ground bushing, with ground wire connected through bushing.
3. Provide No. 12 stranded (green) THHN conductor from outlet box to ground screw of every receptacle.
4. Ground all isolated sections of metallic raceways.
5. Provide #12 minimum stranded (green) THHN conductor sized per NEC, or as noted, connected continuously throughout branch circuit for all circuits, bonded to panel ground bus, and to all electrical devices and equipment enclosures.

B. Distribution Panels:

1. General: Distribution Board shall be distribution panel type, surface mounted; NEMA 3R enclosure with ground bus and insulated full capacity neutral bus.
2. Equipment:
   The Distribution Board shall be braced for a short circuit current as indicated on the drawings. Bracing shall be per NEMA and UL standards.
3. All connections between bus bars shall be of a bolted type using Belleville washers. Clamps will not be accepted. All bus bars shall be accurately formed, and all holes shall be made in a manner, which will permit bus bars and connections to be fitted into place without being forced.
8. The design of all current-carrying devices or parts of the distribution panel shall conform to the standard specified in the related sections of Underwriters' Laboratories, Inc. (UL) No. UL-891 and National Electric Manufacturer's Association (NEMA) Standard PB-2, except as these characteristics may be modified herein.
9. Bus bars, connection bars and wiring on the back of the panel shall be arranged so that maximum accessibility is provided for cable connections from the front.
10. Ampere ratings for rectangular bus bars shall be in accordance with the temperature rise standard of National Electric Manufacturer's Association (NEMA) and the Underwriters' Laboratories, Inc. (UL).
11. Parkerizing, bonderizing or phosphorizing shall chemically clean the enclosure as a unit after all welding has been completed. The enclosure shall then be painted with a rust- resisting primer coat of paint and shall be finished with a coat of light gray, baked enamel.
12. Each section shall be bussed for the full-connected load of that section. Extend bussing to spare circuit breaker "Spaces." Drill busses for future circuit breakers, and provide breaker connector hardware as required.
13. Provide aluminum bus bars and connections with silver-plated contact surfaces.
14. The contact surfaces and studs of all devices to which bus connections are made shall also have silver-plated surfaces.
15. Locate ground bus, with a cross-section equal to at least 25 percent of the capacity of the main bus rating, in the back of the Distribution Board and extend bus throughout the length of the switchboard assembly. Ground each housing of the assembly directly to this bus.
16. Rigidly support all bus and connection bars and current transformers.
17. Fit all nuts and connections with locking devices to prevent loosening.
18. Provide load connections with solderless lugs. Factory-install all devices shown on Drawings as specified herein.

C. Circuit Breakers:

1. General: Circuit breakers shall be molded case rated for 240 volts, multiple or single pole and amperage rating as shown on the drawings, bolt on, manually operated.
2. Circuit breakers shall be shall be rated to interrupt the available short circuit current as indicated on the drawings.

PART 3 - EXECUTION

3.01 Refer to section 26 05 00 for details of work under this section.

3.02 TESTS

A. Testing and Inspection: See Section 26 08 00 - Testing.

- END OF SECTION -

SECTION 26 2700
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the electrical work as shown on the drawings and as specified hereinafter, including but not limited to the work listed below:
1. Raceways, feeders, branch circuit wiring, wiring devices, safety switches and connections to all equipment requiring electric service.

B. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

C. All work shall comply with Section 26 05 00.

1.02 RELATED WORK

A. Division 1 – General Requirements

1.03 SUBMITTALS

A. Comply with the provisions of Section 26 05 00.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Refer to Section 26 05 00, Basic Electrical Requirements, Part 2 - Products.

B. List of Equipment Manufacturers:
1. Conduit and Conduit Fittings
Allied Tube and Conduit
Western Tube and Conduit
LTV Steel Tubular
National Electric Products
AFC
Republic Steel Corporation
Rome Cable Corporation
United States Steel Corporation
Killark Electric Manufacturing Company
Raco
VAW Aluminum Company
Bridgeport
Steel City
Thomas & Betts
Carlon
O.Z. Gedney
Appleton
Regal

2. Wire and Cable (600V)
   - American Wire Company
   - General Wire and Cable Corporation
   - Okonite Company
   - Rome Cable Corporation
   - Cerrowire
   - American Insulated Wire
   - AFC Cable Systems
   - Essex
   - Simplex Wire and Cable Company
3. Solderless Lugs and Grounding Connections
   - Burndy Engineering Company, Inc.
   - O.Z. Gedney Company, Inc.
   - Penn Union Electric Corporation
   - Thomas and Betts Company, Inc.
4. Pull Boxes, Gutters, Special Cabinets
   - Square D Company
   - Columbia Electric Manufacturing Company
   - General Electric Company
   - Westinghouse Electric Corporation
   - Circle Awalt
5. Outlet Boxes
   - Appleton Electric Company
   - Killark Electric Manufacturing Company
   - Lew Electric Fittings Company
   - National Electric Products Corporation
   - Raco
   - Steel City Electric Company
   - Carlon
   - Bowers
6. Floor Boxes
   - Steel City Electric Company
   - Harvey Hubbell, Inc.
   - RCI
   - Walker
7. Wiring Devices
   - Leviton
   - Arrow-Hart
   - Harvey Hubbell, Inc.
   - Lutron
   - Bryant
8. Conduit Racks, Hangers
   - General Electric Company
   - Killark Electric Manufacturing Company
   - Caddy
   - National Electric Products Corporation
   - Republic Steel Corporation
   - Rome Cable Corporation
   - United States Steel Corporation
   - VAW Aluminum Company
   - Superstrut
   - B-Line
9. Safety Switches (Disconnect and Fusible)
   - Square D Company
   - Cutler Hammer, Inc.

General Electric Company
Westinghouse Electric Corporation

10. Fuses
    Bussman Manufacturing Company
    Chase-Shawmut Company
11. Firestopping
    3M
    Nelson

2.02 MATERIALS

A. Raceways: Only the raceways specified below shall be utilized on this project. Substitutions shall be pre-approved in writing. All bare conduit ends (stub-ups or stub-outs) shall be provided with bushed ends or manufactured insulated throat connectors:
   1. Rigid Type - hot dip galvanized or sherardized steel, use on all exterior locations, below deck, below grade or in concrete slab, and to 18" on either side of structural expansion joints in floor slabs (see item 15 below), with completely watertight, threaded fittings throughout.
      a. All rigid steel conduit couplings and elbows in soil or concrete or under membrane to be ½ lap wrapped with Scotch #50 tape and threaded ends coated with T&B #S.C.40 rust inhibitor prior to installation of couplings.
      b. ½ lap wrapp all rigid steel conduit stub-ups from slab or grade to 6" above finished grade level with Scotch #50 tape.
   2. In lieu of rigid steel conduit for power and control raceways and branch circuit conduits in soil or concrete slabs, "Schedule 40" PVC with Schedule 80 PVC conduit elbows and stub-ups may be used with code size (minimum No. 12) ground wire. A “stub-up” is considered to terminate 6" above the finished surface.
      a. Schedule 80 PVC conduit shall be used in all concrete footings or foundations and to 18" of either side of footings or foundation walls.
      b. Schedule 80 PVC conduit shall be used in all concrete masonry unit (CMU) walls or columns.
      c. All conduit runs in concrete floor slabs (where allowed) shall be installed to comply with all applicable UBC and structural codes to maintain the structural integrity of the floor slab. Where conflicts occur, alternate routing shall be provided at no additional cost to the Owner.
   3. Intermediate metal conduit shall be used in all exposed interior locations, except that electrical metallic tubing may be used in some locations as noted below. Utilize steel compression type fittings for all exposed conduit runs, unless otherwise noted. Cast fittings are unacceptable.
   4. Electrical metallic tubing may be used exposed in electrical and mechanical rooms and in unfinished spaces and in concealed and furred spaces, made up with steel watertight or steel set screw type fittings and couplings. Set screws shall have hardened points. Cast fittings are unacceptable.
   5. Use flexible conduit for all motor, transformer and recessed fixture connections (minimum ½"); "Seal-tite" type used outdoors, and in all wet locations, provide with code size (minimum No. 12) bare ground wire in all flexible conduit.
   6. Conceal conduit in ceiling, or walls of all areas where possible, all exposed conduits installed parallel to building members.
   7. Fasten conduits securely to boxes with locknuts and bushings to provide good electrical continuity.
   8. Provide chrome escutcheon plates at all exposed wall, ceiling and floor conduit penetrations.

9. Support individual suspended conduits with heavy malleable strap or rod hangers; supports for ½ inch or 3/4 inch conduit placed on maximum 7-foot centers; maximum 10-foot centers on conduits 1 inch or larger.
10. Support multiple conduit runs from Kindorf B907 channels with C-105 and C-106 straps.
11. Conduit bends - long radius.
12. Flash conduits through roof, using approved roof jack; coordinate with General Contractor.
13. To facilitate pulling of feeder conductors, install junction boxes as shown or required.
14. All empty conduits on the project shall be provided with a nylon pull rope to allow pulling of future conductors intended for the specific raceway. Provide plastic wire-tie style nameplate tags on each end of pull rope with printed identification of conduit use and the location of the opposite end of the rope.
15. Where conduits pass through structural expansion joints in floor slab, rigid galvanized conduit shall be used 18" on either side of joint, complete with Appleton expansion couplings and bonding jumpers, or equal. All above grade expansion joint crossings shall also utilize expansion joint couplings or flex conduit transitions as required for each particular installation. No solid conduits shall be allowed to cross expansion joints without proper provisions for building and seismic movement.
16. Minimum cover of conduits in ground outside of building - 24 inches, unless otherwise noted.
17. Provide and install exterior wall conduit seals and cable seals in the locations listed below. Coordinate installation and scheduling with other trades:
    a. Conduit seals through exterior wall or slab (below grade): O.Z. Gedney series “FSK" in new cast in concrete locations, series "CSM" in cored locations.
    b. Conduit seals through exterior wall or slab (above grade): O.Z. Gedney series "CSMI."
    c. Cable seals at first interior conduit termination after entry through exterior wall or slab: O.Z. Gedney series "CSBI." Coordinate quantity of conductors at each location.

B. Outlet Boxes and Junction Boxes:
1. One piece steel knockout type drawn boxes, unless otherwise noted, sized as required for conditions at each outlet or as noted.
2. Flush-mounted boxes equipped with galvanized steel raised covers for device mounting flush with finished surface. Provide extension rings as required on all acoustical or additional wall treatment areas to bring top of cover flush with finished surface (coordinate with architectural drawings). Devices shall be capable of being tightly mounted to boxes without distorting or bending device or mounting hardware.
3. Boxes for fixture outlets: 4-inch octagon or larger as required, or as noted.
4. Outlet and switch boxes for wet locations, cast aluminum FS or FD type with cast aluminum gasketed spring lid cover. Weatherproof “Bell” type boxes are not acceptable.
5. All connectors from conduit to junction or outlet boxes shall have insulated throats. Connectors shall be manufactured with insulated throats as integral part. Insertable insulated throats are unacceptable.
6. Conduit Bodies: Malleable iron type, with lubricated spring steel clips over edge of conduit body, O-Z/Gedney type EW, or equal.

C. Wire and Cable:

1. 600-volt class, insulation color coded, minimum No. 12 awg for branch circuits, No. 14 for control circuits.
2. All conductors shall be copper.
3. Insulation type:
   a. Standard locations: #12 to #1 AWG: THWN for wet locations and THHN for dry locations. #1/0 through #4/0 AWG: XHHW (55 Mils). 250MCM and larger: XHHW (65 Mils). All wire sizes used shall be based on a 75 degree insulation rating, unless specifically used with 90 degree rated breakers and devices.
   b. High temperature and non-standard locations: Provide wire type and insulation category suitable for area of use as defined in NEC table 310-13.
4. Conductors No. 8 and larger and as otherwise noted on drawings shall be stranded. Conductors No. 10 and smaller shall be solid.
5. Install all wiring (low voltage and line voltage) in conduit unless noted otherwise in the drawings, but do not pull into conduit until plastering and taping have been completed and conduits and outlets have been thoroughly cleaned and swabbed as necessary to remove water and debris.
6. Approximately balance branch circuits about the neutral conductors.
7. Connections to devices from "thru-feed" branch circuit conductors to be made with pigtails, with no interruption of the branch circuit conductors.
8. Neutral conductor identified by white outer braid, with different tracers of "EZ" numbering tags used where more than one neutral conductor is contained in a single raceway.
9. Neatly arrange and "marlin" wires in panels and distribution panelboards with "T and B Ty-rap" or approved equal plastic type strapping.
10. All wire and cable shall bear the Underwriters' Label, brought to the job in unbroken packages; wire color-coded as follows:

Voltage	Phasing	A	B	C	N
120/208	3PH4W	Black	Red	Blue	White
208	3PH3W	Black	Red	Blue	--
277/480	3PH4W	Brown	Orange	Yellow	White
480	3PH3W	Brown	Orange	Yellow	--
120/240	3PH4W	Black	Red	Blue	White
240	3PH3W	Black	Red	Blue	--

11. The equipment grounding conductor shall be insulated copper; where it is insulated, the insulation shall be colored green.
12. Label each wire of each electrical system in each pull box, junction box, outlet box, terminal cabinet, and panelboard in which it appears with "EZ" numbering tags indicating the connected circuit numbers.
13. Install feeder cables in one continuous section unless splices are approved by Architect. Exercise care in pulling to avoid damage or disarrangement of conductors, using approved grips. No cable shall be bent to smaller radius than the spool on which it was delivered from the manufacturer. Color code feeder cables at terminals. Provide identifying linen tags in each pullbox.

D. Lugs and Connectors: Thomas and Betts "lock-tite", for No. 4 and larger wire; "Scotchlock" fixed spring type with insulator for No. 6 and smaller wire.

1. All splices made up with wire nut connectors shall be solidly twisted together with electricians pliers before connector is installed to ensure a proper connection in the event of wire nut failure. No exceptions.

2. Connectors listed or labeled for “no wire twisting required” are not an acceptable substitute for actual wire twisting.
3. Utilize porcelain type connectors in all high temperature environments (above 105 degrees Celsius).

E. Splice Insulation: "Scotch" electrical tape with vinyl plastic backing or rubber tape with protective friction tape for interior work.
1. Provide watertight cast splices for all conductors in site pullboxes or wet locations.

F. Identification: Refer to Section 26 05 00.

G. Firestopping: as manufactured by 3M Fire Protection Products or equal.
1. Fire-rated and smoke barrier construction: Maintain barrier and structural floor fire and smoke resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound vibration absorption, an at other construction gaps.
2. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetration type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall penetrations. Systems or devices must be asbestos free.

H. Fused Safety Switches

1. Safety switches shall be Heavy Duty Nema 3R with provisions for low peak dual element time delay Class RK1 fuses or equal.

I. Motor Rated Toggle Switches

1. 208V, 15A, 2 pole Nema 1 in 1-gang box. Approved manufacturers are Pass and Seymour, Leviton, or equal.

PART 3 - EXECUTION

3.01 Refer to Basic Electrical Requirements - Section 26 05 00 for work under this Section.

3.02 TESTS

A. Testing and Inspection: See Section 26 08 00 - Testing.

- END OF SECTION -