Glendale Unified School District

Herbert Hoover High School
ORG Classroom Building

651 Glenwood Road
Glendale, CA 91202

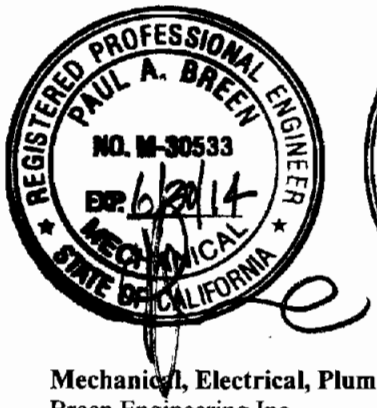
100% CD
TECHNICAL SPECIFICATIONS

VOLUME 1

Osborn

Architect's Job No.
A11048

June 5, 2012



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IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT

APP03-114362

AC N.N. FLS MTSS

DATE JUN 21 2012

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SECTION 01 10 00

SUMMARY OF THE PROJECT

PART 1 - GENERAL

1.01 WORK OF THE CONTRACTOR:

A. Scope of Work: Contractor shall perform, within the time stipulated, the Contract, including all of its component parts, and everything required to be performed, and to provide and furnish any and all of the labor, materials, tools, expendable equipment, and all applicable taxes, and all utility and transportation services necessary to perform the Contract and complete, in a workmanlike manner, all of the Work required in connection with the following titled Project in strict conformity with the Contract Documents:

SCHOOL MODERNIZATION
Street
Glendale, California

B. Phasing: Refer to Section 01 11 00 Phasing for Project Phasing Requirements, including milestones.

C. This school is on a traditional school year calendar, August through June. During the period of this contract, school events and educational requirements will limit or prevent access, and will affect Contractor work hours for a portion or all of the school building (s) pertinent to the contract. Contractor shall maintain schedule with full knowledge of these times and dates to be determined. A site-specific calendar will include currently known dates of limited access, or times of the school day that noise will have to be limited, or ceased. These shall include during the time of the project, but not be limited to:

1. No work after 6:00 p.m. on six (6) weekday evenings for back-to-school, open house, and other events per school year at each school site.

2. No work between 8:00 a.m. and 10:00 a.m. on five (5) student attendance weekdays for assembly events per school year.

3. NO NOISE/WORK will be allowed on an Elementary school site between 8:00 a.m. and 12:30 p.m. on twelve (12) student attendance weekdays for testing (four (4) consecutive weekdays, three times) per school year. Second shift work may be accommodated with the request pre-approved by the District Project Manager.

4. NO NOISE/WORK will be allowed on a Middle School or High School site between 8:00 a.m. and 1:30 p.m. on twenty (20) student attendance weekdays for testing (four (4) consecutive weekdays during the first semester; sixteen (16) consecutive weekdays during the second semester) per school year.

Second shift work may be accommodated with the request pre-approved by the District Project Manager.

D. It shall be noted that there are students in the Early and Extended Education Learning Program in attendance on the Elementary school sites from 6:00 a.m. through 6:00 p.m. on a daily basis throughout the school year, and on each day that Classified Staff are assigned working hours (see specific EEELP calendar for each site, per each school year).

E. Work hours for the Project shall be from 7:00 a.m. until 10:00 p.m. Monday through Saturday, unless advance permission to deviate from these hours is obtained from the City of Glendale per Glendale Municipal Code, Title 8, Chapter 36, and this request is also approved in writing five working days beforehand by the District Project Manager.

F. Article 3 of the Bid General Conditions requires preparation of a Cost-loaded time logic schedule with a single critical path. If the Board approved lowest responsive and responsible bid Contractor and the Project Manager, on behalf of the District, cannot agree on the contract construction schedule and the project single critical path within fifteen (15) days after Notice to Proceed, the District may terminate the Contract, for convenience, as outlined in the Project General Conditions. In the event this is necessary, compensation to the General Contractor and all subcontractors or materialmen shall be limited to Mobilization costs only.

G. The liquidated damages shown in the Supplementary General Conditions shall apply to each phase of the phased construction plan, as defined by and within the plans and specifications.

H. No warranties or guarantees shall go into effect, for any trade, regardless of when completed in the sequence of the project erection, until one (1) day after the Board of Education has accepted the project at a noticed meeting. Attention: Bidders. This will require certain trades to bid for, and provide, a warranty of longer than one (1) year in length from the time of installation or furnishing of their materials to the project, depending upon the sequencing of their work within the overall schedule.

I. All project close-out/punchlist items, project record documents, submittals, and operations manuals and spare parts, warranties and guarantees and Contractor's Final Verified Report (DSA6) shall be reviewed and accepted prior to the Architect/District agreed upon authorization to file the Notice of Completion with the Los Angeles County Recorder.

J. In the event that any materials requiring DSA Inspection (steel, concrete, masonry grout, etc.) are manufactured in an area located more than one hundred miles (100 miles) by air radius from the project site, all round-trip travel and all per diem costs incurred by the District on behalf of the Deputy Inspector who must perform on-site examination of the materials shall be borne 100% by the Contractor as an added expense. This charge shall be subtracted from the monthly "Application for Payment" submitted to the District on behalf of the project.

K. In the event the General Contractor or any subcontractor or materialman (on or off site) voluntarily accelerates the schedule for their own purposes, and/or voluntarily performs work in excess of eight (8) hours per day, or on the weekends or holidays, the additional cost of the Inspectors' overtime premiums which are required to inspect the work during these hours shall be paid 100% by the Contractor. This charge shall also be subtracted from the monthly "Application for Payment" submitted to the District on behalf of the project.

L. In the event that the Contractor fails to complete all punch list items and turn over all "deliverables, warranties, As-builts, etc." within sixty (60) days after acceptance of completion by the Board of Education, the full salary costs of one (1) construction Project Manager (16 hours per week @ $120.00/hour) and one DSA Inspector of record (actual hours spent @$80.00/hour) shall be backcharged to the Contractor, in addition to the liquidated damages, if any, imposed upon the Contractor for late performance. THIS PARAGRAPH WILL BE STRICTLY ENFORCED.

M. The submission of complete project record documents, as required by the specifications, is critical. A value of Thirty Thousand Dollars ($30,000.00) shall be assigned to these record documents within the Schedule of Values and will not be paid or released until the documents are approved by the Architect and turned over to the District's Administrator of Planning, Development and Facilities.

M. The intent of these contract documents is that the work of alteration, rehabilitation or construction is to be accordance with Title 24, California Code of Regulations. Should any existing conditions such as deterioration or non complying construction be discovered which is not covered by the Contract Documents wherein the finished work will not comply with Title 24, California Code of Regulations, a change order, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work.

1.02 RELATED WORK BY DISTRICT:

A. General: All such work indicated in Contract Documents and/or specified herein.

B. Coordination:

1. Contractor shall schedule and coordinate Owner work with his work; give 5 days min. advance notice of all dates; verify that Owner work has been accomplished prior to beginning his work

C. Owner Furnished Items or Products (IF ANY):

1. Owner Responsibilities:

a. Delivery of items or products to site.

b. Schedule delivery date with supplier in accord with Contractor's schedule.

c. Obtain installation drawings and instructions.

d. Submit claims for transportation damages.

e. Arrange guarantees, warranties.

2. Contractor's Responsibilities:

a. Schedule required delivery date for each product, and inform Owner.

b. Promptly inspect delivered products, report damaged or defective items.

c. Unload; handle at site, including uncrating and storage.

d. Protect from exposure to elements, from damage.

e. Repair or replace items damaged as result of Contractor's operations.

f. Install, connect, finish products.

B. The Contractor shall provide adequate storage within his fenced staging area, to store the equipment. The Contractor is solely responsible for the storage of this equipment within his staging area and all subsequent movement of this equipment. The Contractor shall be solely responsible for the maintenance and protection of all material.

C. Bidders submitting under this Contract shall include the price for all necessary coordination with the District and the equipment manufacturer, as required for proper and complete coordination between all trades and all Contractors, within their bid.

1.05 WORK BY OTHERS

A. The District reserves the right to do other work in connection with the project or adjacent thereto by contract or otherwise, and Contractor shall at all times conduct the work so as to impose no hardship on District or others engaged in District's work nor to cause any unreasonably delay or hindrance thereto.

B. Where two or more Contractors are employed on related or adjacent work, each shall conduct their operation in such a manner as not to cause delay or additional expense to the other.

C. Contractor shall be responsible to others engaged in the related or adjacent work for all damage to work, to persons, or for loss by failure to finish the work within

the specified time for completion. Contractor shall coordinate his work with the work of others so that no discrepancies shall result in the project.

PART 2 - PRODUCTS (NOT USED)
PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Alternates: This Section identifies each Alternate by number, and describes the basic changes to be incorporated into the Work, when the specific Alternate is made a part of the Work.

1. Referenced sections of specifications stipulate pertinent requirements for products and methods to achieve the work stipulated under each alternate.

2. Coordinate pertinent related work and modify surrounding work as required to properly integrate the work under each Alternate, and to provide the complete construction required by Contract Documents.

B. Owner's Option: Incorporation of any Alternate into the Work is at Owner's option.

1.02 DESCRIPTION: BASE BID

A. All of the "In-Contract" work shown on Contract Documents, except for additive Alternates.

B. Contractor's overhead, profit, bond, taxes and required permit fees on above items.

1.03 ALTERNATE LIST: N/A

1.04 CONTRACT CONSIDERATIONS:

A. Indicate prices for each alternate on Bid Form; if no change in price required, indicate no change.

B. Indicate on the bid form the amount to be added or deducted from the base bid, should the alternate be accepted.

C. Include in alternate price all miscellaneous materials, parts, accessories incidental to or required for a complete installation regardless of whether they are mentioned in the alternate description.

D. Voluntary alternates will not be considered in evaluation of bids.

E. The Owner reserves the right to accept any or all alternates in order or combination.

F. The Owner reserves the right to accept no alternates.

G. Accepted alternates will be identified in the Agreement.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 Alternates

A. Notify in writing each party involved of the status of each alternate, immediately after notification by the Owner's Project Manager.

B. Coordinate alternate work with related work and modify adjacent work as required.

END OF SECTION

SECTION 01 25 00

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A PRODUCT LIST:

1. Within ten (10) working days after date of Contract, submit to the Architect five (5) copies of complete lists of all products which are proposed substitutions and those proposed as "or equal:" to products specified, and in accordance with Contract documents.

2. For products specified only by reference standards, select any product meeting standards, by any manufacturer.

3. For products specified by naming several products or manufacturers, select any products and manufacturer named.

1.02 SUBSTITUTIONS

A. Requests for substitutions shall be made only in writing on the "SUBSTITUTIONS REQUEST" form attached with all blanks completed except those reserved for the Design Consultant. All substitution requests shall be made by the Contractor.

B. In connection with the use of any substitute item approved by the Architect it shall be the Contractor's responsibility to see that such items meet all space requirements, and that any alterations to connecting items necessitated by use of the alternate items are properly made, at no increase in cost to the District.

C. In making request for substitutions, Bidder/Contractor represents that:

1. He has investigated the proposed products or method and determined that it is equal or better in all respects to that specified and that it fully complies with all requirements of the Contract Documents.

2. He will meet all contract obligations with regards to this substitution;

3. He will coordinate installation of accepted substitutions into the work, making all such changes and any required schedule adjustments, at no additional cost to the District, as may be required for the work to be completed in all respects;

4. He waives all claims for additional costs and additional time related to substitutions which consequently become apparent. He also agrees to hold the District and Architect harmless from claims for extra costs and time

incurred by other subcontractors and suppliers, or additional services which may have to be performed by the Architect, for changes or extra work that may, at some time or date, be determined to be necessary in order for the work to function in the manner intended in the Contract Documents.

5. He shall provide the same warranty and guarantee, and perform any work required in accordance therewith, for the substitution that is applicable to the specified item for which the substitution is requested;

6. Material shall be installed , handled, store, adjusted, tested, and operated in accordance with the manufacturer's recommendation and as specified in the Contract Documents.

7. In all cases, new materials shall be used unless this provision is waived by written notice from the Architect or unless otherwise specified in the Contract Documents; and

8. All material and workmanship shall in every respect be in accordance with and in conformity with approved modern and accepted industry practices, and shall conform to all applicable codes, regulations, laws, ordinances, and Contract Documents.

1.03 DESIGN PROFESSIONAL OPTIONS

A. The Architect will be sole judge of acceptability of any proposed substitutions, and only approved substitutions that are accepted in writing may be used on contract work.

B. Each request for substitution approval shall include:

1. "Substitution Request" form with all required data completed, and accompanying specifications, etc., in triplicate.

2. Identity of product for which substitution is requested; include specifications page and paragraph number.

3. Identity of substitution; include complete product description, drawings, photographs, performance and test data, and any other information necessary for evaluation.

4. Quality and technical specification comparison of proposed substitution with specified products.

5. A description of changes required in other work because of substitution.

6. Effect on construction progress schedule.

7. Cost comparison of proposed substitution with specified product.

8. Any required license fees or royalties.

9. Availability of local maintenance service within a 50 mile air radius of the project.

10. Source of replacement material or spare parts; if necessary, within a 50 mile air radius of the project.

1.04 SUBSTITUTION REQUESTS DURING BIDDING PERIOD

No request for substitution approval will be considered unless written request in triplicate has been submitted on the "Substitution Request" form included herein, and has been received by the Architect at least ten (10) working days prior to bid opening date. The Architect will issue addenda prior to bid opening listing all approved substitutions, should there be any approved.

1.05 SUBSTITUTION REQUESTS AFTER CONTRACT AWARD

A. Approval will be granted only when:

1. Specified product cannot be delivered without project delay, or

2. Specified product has been discontinued, or,

3. Specified product has been replaced by superior product, or

4. Specified product cannot be guaranteed as specified, or

5. Specified product will not fit within designated space, or

6. Substitution otherwise determined by the District to be in its best interest.

B. The Contractor's request for substitution shall be accompanied by evidence documenting the reason for the substitution falls within one or more of the cases listed in A1 through A6 above.

C. A Change Order authorizing substitutions and revising Contract Sum where appropriate will be issued for approved substitutions.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SUBSTITUTION REQUEST (in triplicate)

TO:_____

PROJECT:_____

SPECIFIED ITEM:

_____

SECTION PAGE PARAGRAPH DESCRIPTION

The undersigned requests consideration for the following:

PROPOSED SUBSTITUTION: _____

_____

STATE THE REASON(S) FOR PROPOSED SUBSTITUTION: (REASON MUST CONFORM TO ONE OR MORE CASES LISTED IN PARAGRAPH 1.05 A1 THROUGH 1.0A6.)

_____

_____

_____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request and applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents which the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments are correct:

1. The proposed substitution does not affect dimensions shown on drawings:
2 The undersigned will pay for changes to the building design, including Architect's and engineering design, detailing, and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse affect on other trades, the construction schedule or specified warranty requirements.
4. Maintenance and service parts will be locally available (<50 miles from project) for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item.

Submitted by:

Signature:_____

For use by the Architect:

☐ Accepted ☐ Accepted as noted

Firm: _____ ☐ Not Accepted ☐ Received too late

Address: _____ By: _____

_____ Date: _____

Date: _____ Remarks: _____

Telephone: _____ _____

Attachments: _____

_____

SECTION 01 25 01

REQUEST FOR INFORMATION (RFI)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Procedure for requesting clarification of the intent of the Contract Documents.

1.02 RELATED SECTIONS

A. Section 01 10 00: Summary of Work

B. Section 01 32 00: Schedules and Reports

C. Section 01 77 00: Project Closeout

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 PROCEDURE

A. Prime Contractor shall prepare a Request for Information on the form provided and approved by the Architect and District. Prior to the submission of any RFI Prime Contractor is responsible for thoroughly reviewing all contract documents to insure that the answer to the question is not contained therein. Prime Contractor shall transmit the Request for Information to the Architect with any supporting information.

B. Prime Contractor shall maintain a log of all RFI's that he submits to the Architect on a weekly basis at the weekly project meetings. RFI's shall be identified with a sequential number and be dated. Reference your company's name and the name of the subcontractor asking the question, if applicable, as well as the scope of work.

C. RFI question and location shall be specific and clear. Indicate reference to construction documents sheet and detail number, as well as specification section.

D. ARCHITECT response is a clarification of the intent of the Contract Documents and does not authorize changes in the Contract Amount, Milestones and/or Contract Time.

E. A Request for Information may be returned with a stamp or notation "Not Reviewed", if, in the opinion of ARCHITECT:

1. The requested clarification is ambiguous or unclear to ARCHITECT

2. The requested clarification is equally available to the requesting party by researching and/or examining the Contract Documents

3. Prime Contractor has not reviewed the Request for Information prior to submittal to Architect.

F. Allow a minimum of seven (7) calendar days for review and response time, after receipt by ARCHITECT. Architect will forward response to Contractor and Project Manager and DSA Inspector.

END OF SECTION

SECTION 01 31 00

PROJECT COORDINATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Coordination of Work of Contract.

1.02 RELATED REQUIREMENTS

A. General Conditions

B. Section 01 73 29 — Cutting and Patching

D. Section 01 31 50 — Project Meetings

E. Section 01 25 00 — Substitutions and Product Options

F. Section 01 77 00 — Project Closeout

1.03 SUBMITTALS

A. Coordination Drawings: Submit as specified herein.

B. Work Plans: Submit as specified herein.

1.04 DESCRIPTION

A. Coordinate scheduling, work activities, submittals, including deferred approvals, District separate contracts and work of the various sections of Specifications in accordance with the Master Project Schedule.

B. Coordinate sequence of Work to accommodate District's separate contract and District's Occupancy as specified.

C. Set up control procedures so that the Master Project Schedule is adhered. Contractor's responsibility is to properly notify District's Project Manager of anticipated and actual time delays. Refer to General Conditions.

D. Coordinate the Work and do not delegate responsibility for coordination to any Subcontractor.

E. Anticipate the interrelationship of all Subcontractors, District separate contracts, and their relationship with the Work

F. Resolve differences or disputes between Subcontractors concerning coordination,

OR interference of Work between SECTIONS.

1.05 NOT USED

1.06 NOT USED

1.07 COORDINATION

A. General: Work of the Contract includes coordination of the entire work of the Project, from beginning of construction activity through Project close-out and warranty periods.

B. Mechanical/Electrical Requirements of General Work: Comply with applicable requirements of Division 15 Sections for Mechanical Provisions within units of General Work, and comply with applicable requirements of Division 16 for Electrical provisions within units of General Work.

C. Service Connections: Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work, and final connection of electrical services to general work is defined as electrical work.

D. Coordination: The Project will require close cooperation and coordination with the school site administration, the Architectural team, District Project Manager, and Contractor and Subcontractors. The Contractor shall consider all such coordination in his work inclusive, but not limited to, scheduling and proper sequencing of the Work with subcontractors and the District school site calendar and times that work cannot be, or occupied areas of the project school site that cannot be undertaken, during the entire project. In particular, the coordination of work before District's substantial completion of each project phase, and ensuring the site administration, the Architectural team, Inspector, and District Project Manager are fully advised of his activities to complete the Work in accordance with the Master Project Schedule.

E. Coordination/Engineering Drawings:

1. Contractor shall prepare and submit complete 1/4 " = 1'0" coordination drawings, Including plans, sections, details, etc., indicating the complete layout and all mechanical and electrical materials and equipment in all areas and within the ceiling spaces for new and existing conditions, including bottom of duct, pipe, conduit and elevations to allow District Architectural team to review with other Prime Trade Contractors' work that Contractor ensures will be coordinated properly.

2. Mechanical, plumbing and electrical Prime Trade Contractors shall be responsible for providing all vertical sections through floors showing structural physical restraints, architectural restraints, plenum spaces and all other physical obstructions that may affect work.

3. Electronic reproduction or photo reproduction of the project's Architectural, Structural, or MEP drawings will not be acceptable.

G. Mechanical, plumbing and electrical Prime Trade Contractors shall prepare a 1/4" sleeving layout indicating size and location of sleeves. Provide copies to applicable trades and District Architectural team.

H. Coordination/Engineering Drawings: These drawings are for the Contractor's and District's Representative's use during construction and shall not be construed as replacing any shop drawings, "as-built", or Record Drawings required elsewhere in these Contract Documents.

I. Debris Removal and Material Access: An area will be designated for debris removal and material access as agreed by the Contractor and Architectural team at the school site.

1.08 EQUIPMENT COORDINATION

A. Equipment Coordination: With respect to mechanical and electrical features of Contractor and/or District supplied equipment, complete data must be exchanged directly between the Contractor and those vendors and subcontractors involved as the progress of the Project requires. The person requesting the information shall advise when it will be required.

B. The Prime Trade Contractor's for casework and equipment are expressly required to provide large scale layout drawings for casework and equipment showing the required rough-in locations of all services (dimensioned from building features) service characteristics, and locations of studs where the location is critical to mounting or otherwise installing equipment and casework. Furnish sizes and spacing required for Mechanical and Electrical cutouts, and a complete brochure of fittings, sinks, outlets, or other information to provide complete data on the items and accessories being furnished.

C. In the event of incorrect, incomplete, delayed or improperly identified information, the entity causing the delay or error shall be responsible and pay for any modifications or replacements necessary to provide a correct, proper and new installation, including relocations required.

1.09 MEETINGS

A. In addition to progress meetings specified in Section 01 31 50, attend coordination meetings and pre-installation conferences with requisite personnel to assure coordination of Work when scheduled with the Architectural, Engineer, Inspector, or Project Manager.

1.10 COORDINATION OF SUBMITTALS

A. Schedule and coordinate submittals as required and as specified in Section 01 33 00.

B. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such materials and equipment.

C. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other sections.

D. Prime Trade Contractors shall submit the following drawings for review and approval:

1. Fire Protection Drawings.

2. Fire Alarm System.

1.11 COORDINATION OF SPACE

A. Mechanical, plumbing and electrical Prime Trade Contractors shall coordinate use of Project space and sequence of installation of mechanical, and electrical work which is indicated diagrammatically on Drawings. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

B. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

C. Off-Site Fabrication: Off-site fabrication is encouraged as much as possible and deliveries scheduled so materials and equipment can be installed immediately after delivery. The Contractors shall alert and advise materialmen of the need to hold deliveries until they are notified the materials are required on the site.

1.12 ELECTRICAL COORDINATION

A. Provide supervision, communications, and coordination necessary to meet the requirements of electrical power connection as set forth by the designated power company (e.g. Glendale Water and Power; SoCal Edison).

B. Provide reasonable and convenient staging and access areas near buildings to permit the respective Utility or its vendors or subcontractors, to install, modify or remove equipment and other components of the electrical power system furnished and installed by the designated power company.

1.13 COORDINATION OF CONTRACT CLOSEOUT

A. Coordinate completion and cleanup of work of separate sections in preparation of District school site occupancy with approval of final cleanup by the Inspector and Project Manager.

B. After District occupancy of premises, coordinate access to site by various sections for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of District/school activities.

C. Assemble and coordinate closeout submittals specified in Section 01 33 00.

1.14 NOT USED

1.15 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings show, if applicable, existing above and below grade structures, drainage lines, storm drains, sewers, water, gas, electrical, hot water, and other utilities which are known to the District.

B. Locate all known existing installations before proceeding with construction operations which may cause damage to such installations. Existing installations shall be kept in service where possible and damage to them shall be repaired with no adjustment of Contract Sum. District archives as-built drawings, and Contractor shall be responsible to request to view any and all drawings for the areas that may be affected in the construction before the work begins.

C. If any unforeseen structures or utilities are encountered, request District's Architectural Team to provide direction on how to proceed with the Work.

D. If any structure or utility is damaged, take appropriate action to ensure the safety of persons and property and report the same to the District's Architectural Team, and begin immediate remediation of any safety-related condition.

PART 2 — PRODUCTS - NOT USED.

PART 3 — EXECUTION - NOT USED

SECTION 01 31 50

PROJECT MEETINGS

PART 1-GENERAL

1.01 SUMMARY

A. Work Included in this Section:

1. The Contractor's participation in preconstruction conference, application for payment, and guarantees, bonds, service and maintenance contracts review meetings.

2. The Contractor's administration and participation in project weekly progress meetings, pre-installation conferences and other meetings, as necessary.

1.02 PRE-CONSTRUCTION CONFERENCE

A. Prior to commencement of Work, attend a pre-construction conference at time and a place selected by the School District to discuss procedures to be followed during the course of the work.

B. The purpose of the conference is to introduce the Balboa Elementary School Project with the Architectural Team, the Inspector, the Construction/Project Managers, and the School's Representative key personnel, to review the contract provisions, project procedures, and other items pertaining to the Project; distribute documents including sample forms referenced in the Contract Documents; answer any questions related to construction contract administration; and establish schedule and procedures for future meetings. (This meeting is NOT to discuss any construction related specific specifications and drawings, nor address any requests for substitutions, etc.)

C. Attending shall be:

1. District Representatives from Planning, Development and Facilities, Facility and Support Operations, and/or the Business Office.

2. School Site Representatives, including the Construction Liaison

3. The Project Inspector of Record

4. The Architect of Record, and Architect's Construction Architect

5. The Engineering Consultants

6. The Contractor's Contracts Representative/Project Manager

7. The Contractor's on Site Representative/Superintendent

8. Representatives of the major subcontractors, as necessary

1.03 CONSTRUCTION PROGRESS MEETINGS

A. During the course of construction, progress meetings will be held to discuss and resolve field problems.

B. Meeting Schedule: At maximum one-week intervals or more often when required by the Architect/Inspector and/or Project Manager.

C. Meeting Location: As designated by the District's Project Manager, in conjunction with the School Site liaison.

D. Attending shall be:

1. The District's Representative from Planning, Development and Facilities, Facility and Support Operations, and/or the Business Office

2. The Project Inspector of Record

3. The Architect's Construction Architect

4. The Engineering Consultants as appropriate to the Meeting Minute format, and as agreed upon by the Contractor and the Project Manager beforehand

5. The Contractor's On-Site Superintendent

6. The Contractor's Representative/Project Manager

7. Representatives of subcontractors/major suppliers as appropriate to a specific item of the Meeting Minute format, and at the time the specific item is reflected on the Meeting Minutes.

8. Others as appropriate to the Meeting Minute format and as agreed upon by the Contractor and the Project Manager beforehand.

NOTE: Representatives of the Contractor, subcontractors and suppliers attending Construction Progress Meetings shall be qualified and authorized to act on behalf of the entity each represents.

F. Suggested Agenda:

1. Review and approve minutes of previous meeting.

2. Review of work progress since previous meeting.

3. Review of upcoming work to take place in project schedule.

4. Discuss School Site concerns with regard to safety, paths of travel, and any upcoming events that may affect the work schedule.

5. Discuss field observations, problems, and decisions, affecting the work.

6. Review submittals schedule and status of submittals.

7. Review status of proposed substitutions, if any.

8. Review off-site fabrication and delivery schedules.

9. Review maintenance of progress schedule.

10. Agree on corrective measures to regain projected schedules, as necessary.

11. Review planned progress during succeeding work period.

12. Review coordination of projected progress.

13. Review maintenance of quality and work standards.

14. Review project safety of workers and practices.

15. Review any Inspector of Record Field Notices, or Deviations logs.

16. Other items relating to the Work.

G. The Architect, in coordination with the Project Manager, will make physical arrangements for project meetings, and the Architect shall prepare agenda, preside at meetings, record minutes, and distribute electronic draft copies of Minutes within three working days after Construction Project Meetings to the Project Manager, Inspector, conference participants and those affected by the decisions made at the conference. The Architect will record in the minutes significant discussions and agreements and disagreements.

1.04 PRE-INSTALLATION CONFERENCES

A. The Architect/Inspector may conduct a pre-installation conference at the site before each construction activity that the Architect/Inspector deems requires coordination with other construction or when required by the Construction documents.

B. Attendance will be required of parties directly affecting, or affected by, or involved in the installation, and its coordination or integration with other materials and installations that have preceded or will follow the particular item of work or activity under consideration. Parties attending the conference shall be

qualified and authorized to act on behalf of entity each represents.

C. Conference Schedule: Schedule conference to assure a sufficient amount of time prior to the scheduled work or activity under consideration so that any concerns, problems or disagreements can be resolved without delaying the Project.

D. The Architect, on conjunction with the Inspector, will make physical arrangements for conferences, prepare the agenda, preside at conferences, record minutes, and distribute copies within two working days after a conference to the Project Manager, Inspector, conference participants and those affected by the decisions made at the conference. The Architect will record in the progress meeting minutes significant discussions and agreements and disagreements as takes place in pre-installation conferences.

E. Suggested Agenda: Review the progress of other construction activities and preparations for the particular activity under consideration, including requirements for:

1. Contract Documents
2. Options
3. Related Change Orders
4. Purchases
5. Deliveries
6. Shop Drawings, Product Data and quality control Samples
7. Possible conflicts
8. Compatibility problems
9. Time Schedules
10. Weather limitations
11. Manufacturer's recommendations
12. Compatibility of materials
13. Acceptability of substrates
14. Temporary facilities
15. Space and access limitations
16. Governing regulations

17. Safety

18. Inspection and testing requirements

19. Required performance results

20. Recording requirements

21. Protection

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

1.05 OTHER REQUIRED MEETINGS

A. Project Closeout Meeting:

1. Thirty (30) days prior to the estimated substantial completion the project/phase, the Architect, Inspector, and Project will coordinate a meeting to review required construction maintenance manuals, guarantees, closeout submittals, bonds, and service contracts for materials and equipment; review and implement repair and replacement of defective items, and extend service and maintenance contracts, and schedule site training for all equipment.

2. Attending shall be:

a. The District's Representative of Planning, Development and Facilities, Facility and Support Operations, and/or Business Office

b. The Project Inspector

c. The Construction/Project Manager

d. The Engineering Consultants, as appropriate

e. The Contractor's on-site Superintendent

f. Subcontractors, as appropriate

g. Suppliers, as appropriate

h. Others, as appropriate

B. Guarantees, Bonds, and Service and Maintenance Review Meeting:

1. Eleven months following the date of Substantial Completion, the District

Project Manager will convene a meeting for the purpose of reviewing the guarantees, bonds, and service and maintenance contracts for materials and equipment.

2. Attending shall be:

   a. The District's Representative

   b. The Architect

   c. The Engineering Consultants, as appropriate

   d. The Contractor's Representative

   e. Subcontractors and Suppliers, only as appropriate

   f. Others as appropriate

1.06 PRIME TRADE CONTRACTOR MEETINGS

A. Construction Progress Meetings:

1. To be held at maximum one-week intervals or more often when required by the Architect/Inspector/Construction Project Manager.

2. Meeting Location: Contractor Jobsite trailer

3. All Prime Trade Contractors shall attend in order to review progress of work, and submit any questions or requests to the Contractor in order to ensure coordination of installations during the work schedule.

END OF SECTION

SECTION 01 32 00

SCHEDULES AND REPORTS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Coordinate both the listing and timing of reports and other activities required by provisions of this and other Sections, so as to provide consistency and logical coordination between the reports. Maintain coordination and correlation between separate reports by updating at monthly or shorter time intervals. Make monthly distribution of the progress schedule and update to all parties involved in the work including the Architect, Inspector, and Project Manager, along with the Request/Application for Payment. In particular provide definition and coordination of the progress schedule, with phases, changes, schedule of values, funding sources and progress reports.

B. CPM Schedule: Secure critical time commitments for performing major elements of the work of no longer than 60-day increments. Within 30 days after the Notice to Proceed, submit a comprehensive CPM chart progress schedule indicating, by stage-coded symbols, milestones for each major specification section, category, or unit of work to be performed; include minor elements of work, which are, nevertheless, involved in overall sequencing of the work. Include dates for completion of each phase of work. Arrange schedule to show graphically the major sequences of work necessary for the completion of related elements of work. Arrange the schedule to allow for the Architect's review of submittals as well as procedure for certification of substantial completion. Prepare and maintain the schedule on a sheet of sufficient width (or a series of sheets) to show the required data clearly for the entire construction time. Prepare the schedule on sheets of stable transparency, or other reproducible material, to permit reproduction for the required distribution.

C. Daily Reports: Prepare a daily report, recording the following information concerning events at the site; make available to the Inspector for on-site review and submit duplicate copies to the Inspector and Architect upon request:

1. List of Contractor personnel at the site
2. List of Subcontractors at the site
3. Accurate Count of personnel at the site by trade, and Subcontractor
4. Material and Equipment Deliveries
5. High/low temperatures, and general weather conditions.
6. Accidents or injuries.
7. Meetings and significant decisions.
8. Unusual events.
9. Stoppages, delays, shortages, losses.
10. Emergency procedures, field orders.
11. Orders/requests by governing authorities, signed.
12. Services connected, disconnected.

13. Equipment or system tests and start-ups.
14. Partial completions, occupancies.
15. Substantial completion requested.
16. Substantial completion authorized.
17. Requests for Inspections

D. Progress Reports: Contractor shall submit "Verified Reports", on prescribed form, of construction per requirements of Title 24, CCR.

PART 2 - PRODUCTS - NOT APPLICABLE
PART 3 - EXECUTION - NOT APPLICABLE

END OF SECTION

SECTION 01 33 00

STORM WATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Compliance with local, state, and federal regulations, particularly, with the National Pollutant Discharge Elimination System (NPDES) General Permit For Storm Water Discharges Associated With Construction And Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (GP). This includes meeting discharge prohibitions, scheduling, effluent standards, Post Construction Best Management Practices, training, sampling, monitoring, records keeping, receiving water limitations, and annual reporting and certification.

B. Preparation, implementation, upkeep and monitoring of Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the Project site into receiving waters. This includes the elimination of pollution discharges such as improper dumping, storm water that has been in contact with pollutants, erosions, spills or leakage from storage tanks or transfer areas.

C. Payment of application and annual fees required by the State Water Resources Control Board (SWRCB) up until the date of Substantial Completion.

D. Certification the Project has met all of the conditions of the General Construction Activity Storm Water Permit (GP).

E. Electronic filing in State Waterboard website smarts.waterboards.ca.gov including risk level calculations, post construction calculations, ad-hoc reporting, annual reporting.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements.

B. Section 01 50 00 - - Temporary Facilities and Controls.

C. Section 01 77 00 - - Closeout Procedures

D. Section 33 41 00 - - Storm Utility Drainage Piping

1.03 DEFINITIONS

A. BMP Best Management Practice.

B. CASQA California Stormwater Quality Association.

C.	DWQ	Division of Water Quality.
D.	GP	General Construction Activity Storm Water Permit.
E.	LRP	Legally Responsible Person.
F.	NOI	Notice of Intent.
G.	NOT	Notice of Termination.
H.	NPDES	National Pollutant Discharge Elimination System.
I.	PRD	Permit Registration Document.
J.	QSD	Qualified SWPPP Developer.
K.	QSP	Qualified SWPPP Practitioner.
L.	LARWQCB	Los Angeles Regional Water Quality Control Board.
M.	SWPPP	Storm Water Pollution Prevention Plan.
N.	SWRCB	State Water Resources Control Board.

1.04 REQUIREMENTS

A. New or existing Project sites with land disturbance of less than one acre a Permit Registration Document (PRD) is not required, however any BMP indicated in BMP Handbook required to prevent or minimize storm water pollution shall be implemented at no cost to OWNER. CONTRACTOR shall prepare and submit to OAR a SWPPP for review and approval by OWNER.

B. In addition to the above requirements, on new or existing project sites with land disturbance of one (1) or more acres, submit to OAR a PRD with the appropriate filing fee. Pay annual renewal fees until Substantial Completion of the Work. No progress payment will be made to CONTRACTOR until CONTRACTOR has prepared and obtained OAR approval of the plan in addition to, if required, a properly prepared Notice of Intent with the appropriate filing fee to OWNER.

C. Contractor's QSD to prepare and submit to the OAR, within ten days after the date established in the Notice to Proceed, two CDs and four printed copies of the Storm Water Pollution Prevention Plan (SWPPP) as required to comply with storm water pollution regulations for Project site.

D. Submit, along with PRD, the appropriate application fee made payable to: State Water Resources Control Board.

E. Prepare SWPPP by following the format in Chapter 2 of the BMP Handbook. The publication is available from www.cabmpandbooks.com and CASQA (casqa.org):

Blue Print Service
1700 Jefferson Street
Oakland, CA 94612

Los Angeles County Department of Public Works,
Cashier's Office
900 S. Fremont Avenue
Alhambra, CA 91803

1.05 SUBMITTALS

A. Provide documentation in accordance with specific requirements of approved SWPPP.

1. Material quality, grade, type as specified in the Best Management Practice Handbook, BMP, Handbook.

2. Training and qualifications for SWPPP developer (QSD) and practitioner (QSP).

3. Calculations for BMPs requiring design calculations stamped by QSD.

4. Copies of Risk Level Calculations, Post Construction Calculations from Waterboard website prepared by QSD.

5. Electronic Copies of weekly, quarterly, annual reports and test results.

6. Proof of filing with the Waterboard; copies of PRD and all attachments for the specific project risk level.

B. Retain the following documents on site until Substantial Completion.

1. Copy of Permit Registration Documents including NOI and supporting documents.

2. SWPPP and Monitoring Program.

C. Retain the following documents on site until Substantial Completion. Upon Substantial Completion, CONTRACTOR shall forward all required documentation to OAR. OAR will forward records to District Supervising Civil Engineer for retention period of three years.

1. Inspection Records.

2. Annual Report Compliance Certification (Due to Waterboard by September 30th and to the district LRP first Monday in August).

3. Noncompliance Reporting.

4. Training Records.

5. Maintenance records for post construction BMPs.

6. Updated and signed amendment log.

1.06 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: California Storm Water Best Management Practice Handbook for Construction Activity (BMP Handbook) Current adopted edition. OAR will forward SWPP to OWNER Supervising Civil Engineer for review and approval.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Provide the quality, grade and type of materials as specified in Best Management Practice, BMP Handbook.

B. Provide sampling kit from Waterboard Laboratory.

PART 3 – EXECUTION

3.01 IMPLEMENTATION

A. Install perimeter controls prior to starting Work at the Project site.

B. Use BMPs from District-approved SWPPP to contain on-site storm water on the Project site. Do not drain on-site water directly into the storm drain. Use the design storm specified in the GP (24-hour 25 year or 24-hour 50 year for Active treatment system).

C. Designate qualified trained personnel (QSP) and QSD for the proper implementation of the SWPPP. The QSD shall design and the QSP shall implement and inspect BMPs for the design storm and tributary area.

D. Revise SWPPP to suit changing Project site conditions and also when properly installed systems are ineffective.

E. Upon Substantial Completion:

1. Maintain and leave storm water pollution prevention controls in place when required for post-construction storm water management and remove those that are not needed as determined by OAR. Handover maintenance log and maintenance plan to OAR. OWNER will maintain prevention controls left in place.

2. Provide Site Monitoring Reports, SWPPP revisions, Compliance Certifications and related documents to OAR. Post-construction storm water operation and the

management plan as mentioned in the compliance certifications are considered to be in place at Substantial Completion.

3. Notice of Termination (NOT).

3.02 MONITORING

A. Conduct examination of pollution prevention controls and provide Site Monitoring Reports per GP and SWPPP, at least weekly, as well as before and after each storm and each day during storm events. Prepare and maintain, at the Project site, a log of each inspection using Site Monitoring Report forms. Notify to LARWQCB within 30 days if there is any noncompliance.

B. Conduct quarterly non-storm water inspection and complete the attached report.

C. Conduct sampling and reporting as directed by GP.

D. CONTRACTOR shall provide proof annually (no later than July 1) that construction activities are in compliance with SWPPP. Non-compliance shall be reported to OAR immediately.

3.03 SPECIAL MONITORING OF RUNOFF

A. CONTRACTOR is responsible for providing proper storage of tools and materials. If rain or storm water run off comes in contact with pollutants (such as soil stabilizers, paint or fluid from vehicles) report to OAR immediately. CONTRACTOR will be required to sample and remediate contaminated water.

EDIT NOTE: OAR TO NOTIFY OEHS IMMEDIATELY OF NON-COMPLIANCE ISSUES.

3.04 LIABILITIES AND PENALTIES

A. Review of the SWPPP and inspection log by OAR shall not relieve CONTRACTOR from liabilities arising from non-compliance of storm water pollution regulations.

B. Compliance with the Clean Water Act is the sole responsibility of CONTRACTOR. CONTRACTOR shall pay fines issued by Agencies having jurisdiction due to non-compliance to storm water pollution regulations. OWNER shall recover all costs of the fine by appropriate OWNER Assessment.

3.05 CHANGE OF INFORMATION

A. Submit to OAR completed NOI Form for change of information (Construction Site Information and Material Handling/Management Practices).

3.06 NOTICE OF TERMINATION

A. Upon Substantial Completion CONTRACTOR shall submit a Notice of Termination (NOT) to OAR.

3.07 ATTACHMENTS

A. Attachment A - Site Monitoring Report.

B. Attachment B - Compliance Certification.

C. Attachment C – Sample Post Construction BMP installation Log and Maintenance Log.

D. Attachment D – Sample GUSD Construction Storm Water Training Form.

E. Attachment E – OAR/Contractor Check List.

F. Attachment F – Quarterly Non-Storm Water Form.

END OF SECTION

_____ OWNER Project Number	**Glendale Unified School District** **As OWNER** ATTACHMENT "A" **STORM WATER POLLUTION PREVENTION** **SITE MONITORING REPORT**	STATE OF CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

School Name: _____ _____

Project Description: Contract Number

I. **Type of Examination:** (Use one form for each type of examination):

☐ Prior to Anticipated Storm Event ☐ After Actual Storm Event ☐ Weekly

Date Examined: _____

II. Check the response for each SWPPP question below:

	YES	NO
1. Do you have an approved Storm Water Pollution Prevention Plan (SWPPP) and a BMP Handbook on the Project site?	☐	☐
2. Does your SWPPP incorporate an up-to-date erosion control plan?	☐	☐
3. Is the erosion control installed per plan?	☐	☐
4. Is the Work at a stage where the erosion control plan can not be constructed, is the erosion control at the Maximum Extent Practicable for the stage you are in?	☐	☐
5. Did you observe the presence of any floating materials such as oil, grease, pieces of wood, paper, etc., odor, toxics, and/ or sediments?	☐	☐

6. If yes, what is it that you observed? _____

III. Check the status of the following items as observed:

SWPPP Items	Acceptable	Not Acceptable	Repairs Required	Date Repairs Completed
1. De-silting Basins (Cleaned)	☐ --	☐ --	☐	_____
2. Water Quality Basin	☐ --	☐ --	☐	_____
3. Silt Fences	☐ --	☐ --	☐	_____
4. Hay bales/ Check dams/ Sandbags	☐ --	☐ --	☐	_____
5. Berms and Dikes	☐ --	☐ --	☐	_____
6. Sand/Gravel Inlet	☐ --	☐ --	☐	_____
7. Slope Protection - Polymer and Mulch	☐ --	☐ --	☐	_____
8. Vegetation / Re-vegetation	☐ --	☐ --	☐	_____
9. Dust Control	☐ --	☐ --	☐	_____

10.	Surface Erosion	☐	--	☐	--	☐	
11.	Slope Instability	☐	--	☐	--	☐	
12.	Storage	☐	--	☐	--	☐	
13.	Disposal	☐	--	☐	--	☐	
14.	Spills	☐	--	☐	--	☐	
15.	Clean-up	☐	--	☐	--	☐	
16.		☐	--	☐	--	☐	
17.		☐	--	☐	--	☐	

Detailed Storm Water Quality Construction Site Inspection Checklist

ATTACHMENT "A" (Cont.)

GENERAL INFORMATION				
Project Name				
Project Number	GUSD Ref. No.			
Contractor				
Inspector's Name				
Inspector's Title				
Signature				
Date of Inspection				
Inspection Type (Check Applicable)	☐ Prior to forecast rain ☐ 24-hr intervals during extended rain		☐ After a rain event ☐ Other Weekly or Quarterly	
Season (Check Applicable)	☐ Rainy		☐ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (inches)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE		
Total Project Area	_____	Acres
Field Estimate of Active DSAs	_____	Acres
Field Estimate of Non-Active DSAs	_____	Acres

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				
Erosion Control				
Does the applied temporary erosion control provide 100% coverage for the affected areas?				
Are any non-vegetated areas that may require temporary erosion control?				
Is the area where erosion controls are used required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Temporary Linear Sediment Barriers (Silt Fence, Fiber Rolls, Sandbag Barriers, etc.)				
Are temporary linear sediment barriers properly installed, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Location:				
Location:				
Location:				
Location:				
Location:				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Sediment Basins				
Are basins designed in accordance with the requirements of the General Permit?				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				
Location:				
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, run-off from adjacent areas and from winds?				
Are stockpiles located at least 15 m from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				
Location:				
Location:				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Is the entrance stabilized to prevent tracking				
Is the stabilized entrance inspected daily to ensure that it is working properly				
Are points of ingress/egress to public/private roads inspected and swept and vacuumed as needed?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Location:				
Location:				
Location:				
Location:				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Wind Erosion Control				
Is dust control implemented?				
Location:				
Location:				
Location:				
Location:				
Dewatering Operations				
Are all one-time dewatering operations covered by the General Permit inspected before and as they occur and BMPs implemented as necessary during discharge?				
Is ground water dewatering handled in conformance with the dewatering permit issued by the LARWQCB?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of appropriately?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 15 m from concentrated flows and downstream drainage facilities?				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
Temporary Water Body Crossing or Encroachment				
Are temporary water body crossings and encroachments constructed appropriately?				
Does the project conform to the requirements of the 404 permit and/or 1601agreement?				
Location:				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Location:				
Location:				
Location:				
Illicit Connection/ Discharge				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Owner/Operator been notified?				
Location:				
Location:				
Location:				
Location:				
Discharge Points				
Are discharge points and discharge flows free from visible pollutants?				
Are discharge points free of any significant sediment transport?				
Location:				
Location:				
Location:				
Location:				
SWPPP Update				
Does the SWPPP and Project Schedule adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the Erosion Control Plans installed in the proper location(s) and according to the details in the SWPPP?				
Location:				
Location:				
Location:				
Location:				
General				
Are there any other potential concerns at the site?				
Location:				
Location:				
Location:				
Location:				
Storm Water Monitoring				
Does storm water discharge directly to a water body listed in the General Permit as impaired for sediment/sedimentation or turbidity?				

INSPECTION OF BMPs - ATTACHMENT "A" (Cont.)				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
If yes, were samples for sediment/sedimentation or turbidity collected pursuant to the sampling and analysis plan in the SWPPP?				
Did the sampling results indicate that the discharges are causing or contributing to further impairment?				
If yes, were the erosion/sediment control BMPs improved or maintained to reduce the discharge of sediment to the water body?				
Were there any BMPs not properly implemented or breaches, malfunctions, leakages or spills observed which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
If sampling indicated pollution of the storm water, were the leaks, breaches, spills, etc. cleaned up and the contaminated soil properly disposed of?				
Were the BMPs maintained or replaced?				
Were soil amendments (e.g., gypsum, lime) used on the project?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				
If sampling indicated pollution of the storm water by the use of the soil amendments, is there a contingency plan for retention onsite of the polluted storm water?				
Did storm water contact stored materials or waste and run off the construction site? (Materials not in watertight containers, etc.)				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				

IV. Describe any problems or required repairs checked above and the necessary actions needed:

Item	Description of Problem or Required Repair	Action Needed

Examination Performed by CONTRACTOR: _____ _____
By (Print Name, Title and Sign) Date

Verified by Inspector: _____ _____
Print Name, Title and Sign Date

OWNER Project Number	**Glendale Unified School District As OWNER ATTACHMENT "B" GENERAL CONSTRUCTION ACTIVITY STORM WATER PERMIT**	STATE OF CALIFORNIA STATE WATER BOARD WDID NO.

COMPLIANCE CERTIFICATION

School Name: _____
Project Description: _____ Contract Number

ANNUAL CERTIFICATION

I certify the Project has met the following conditions: All elements of the Storm Water Pollution Prevention Plan are in place; construction materials and equipment maintenance waste have been disposed of properly; and the Project site is in compliance with all local storm water management requirements including erosion/sediment control requirements, and the appropriate use permits have been obtained. The reports have been uploaded to smarts.waterboards.ca.gov system.

CONTRACTOR: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

SUBSTANTIAL COMPLETION CERTIFICATION

I certify the Project has been completed and the following conditions have been met: All elements of the Storm Water Pollution Prevention Plan have been completed; construction materials and equipment maintenance waste have been disposed of properly; the Project site is in compliance with all local storm water management requirements including erosion/sediment control requirements and the appropriate use permits have been obtained; and a post-construction storm water operation, and management plan is in place.

CONTRACTOR: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

Glendale Unified School District

REPORT DATE

ATTACHMENT "C"

POST CONSTRUCTION BMP INSTALLATION LOG AND MAINTENANCE LOG

Quarterly Certification Letter

ATTACH SITE PLAN WITH BMPS HIGHLIGHTED

BMP	INSTALLATION INSTRUCTIONS LOCATION	MAINTENANCE DATE	NEXT SCHED DATE
1			
2			
3			
4			
5			
6			

OAR NAME SIGNATURE DATE	CONTRACTOR NAME SIGNATURE DATE

ATTACHMENT "D"
GUSD CONSTRUCTION STORM WATER TRAINING FORM
01 7416 ATTACHMENT C JUNE 2010

MEETING DATE	PROJECT	PROJECT NUMBER

ATTENDANCE-SIGNATURE (Add additional sheets if required)

STORM WATER TOPICS DISCUSSED

SUGGESTIONS / COMMENTS

OAR COMMENTS

OAR SIGNATURE	DATE	CONTRACTOR	DATE

SUGGESTED TOPICS FOR DISCUSSION

[ ] PREPARING FOR A STORM EVENT	[ ] GOOD HOUSEKEEPING	[ ] MAINTENANCE POST BMPS
[ ] MAINTAINING STOCKPILES	[ ] SOURCE CONTROL	[ ] CASQA MANUAL
[ ] DUST CONTROL	[ ] OAR ROLE & RESPONSIBILITY	[ ] SWPPP UPDATING
[ ] TRAINING NEW STAFF	[ ] CONTRACTOR ROLE	[ ] SCHEDULING
[ ] RECORD KEEPING	[ ] FREQUENTLY ASKED QUESTIONS	[ ] PREVENTING FLOODING

Glendale Unified School District

REPORT DATE

ATTACHMENT "E"

OAR / CONTRACTOR CHECK LIST

Quarterly Certification Letter

SITE _____

PROJECT NUMBER _____

IS SWPPP BOOK ONSITE AND UPDATED	[ ] YES	[ ] NO
TRAINING RECORDS	[ ] YES	[ ] NO
CONSTRUCTION SCHEDULE	[ ] YES	[ ] NO
EROSION CONTROL PLAN	[ ] YES	[ ] NO
Property Line Dileanated	[ ] YES	[ ] NO
Active / Inactive Areas	[ ] YES	[ ] NO
Drainage Patterns	[ ] YES	[ ] NO
Discharge Points	[ ] YES	[ ] NO
Sampling Points	[ ] YES	[ ] NO
BMPs with legend	[ ] YES	[ ] NO
Staging Areas, Stockpiles, entrance exit	[ ] YES	[ ] NO
Vehicle Storage, concrete wahsout	[ ] YES	[ ] NO
SIGNED COPY OF NOI ON WALL	[ ] YES	[ ] NO
WEEKLY REPORTS FILED	[ ] YES	[ ] NO
	LATEST DATED: _____	

SWPPP AMENDMENTS DOCUMENTED

ANNUAL FEES PAID AND REPORTS FILED LATEST DATED: _____

Data Submitter _____
login _____
OAR _____
login _____

DATE OF LAST OEHS INSPECTION VISIT LATEST DATED: _____

WERE OEHS RECOMMENDATION IMPLEMENTED [ ] YES [ ] NO

CERTIFICATION OF CONTRACTORS QSP

Name _____
Agency _____
Number _____
Expiration Date _____
Email _____
Phone _____

Sampling Kit Lab Name

COMMENTS

OAR NAME	CONTRACTOR NAME
SIGNATURE	SIGNATURE
DATE	DATE

Glendale Unified School District

Attachment "F"
Quarterly / Annual Non-Stormwater Form

I. WDID NO. _____

II. FACILITY OPERATOR INFORMATION

Facility Name _____ Contact Person _____

Mailing Address _____ Title _____

City _____ State **CA** Zip _____ Phone _____

III. FACILITY SITE INFORMATION

Facility Name _____ Contact Person _____

Location _____ Title _____

City _____ State **CA** Zip _____ Phone _____

IV. PERMIT LANGUAGE

All dischargers are required to conduct quarterly, non-storm water visual inspections. For these inspections, the discharger must visually observe each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

CGP Section II.E describes authorized non-storm water discharges including those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water dewatering, and other discharges not subject to a separate general NPDES permit adopted by a region. Additionally, authorized non-storm water discharges must not be used to clean up failed or inadequate construction or post-construction BMPs designed to keep materials onsite. Authorized non-storm water dewatering discharges may require a permit because some Regional Water Boards have adopted General Permits for dewatering discharges. The General Permit prohibits the discharge of storm water that causes or threatens to cause pollution, contamination, or nuisance.

Non-storm water discharges directly connected to receiving waters or the storm drain system have the potential to negatively impact water quality. The discharger must implement measures to control all non-storm water discharges during construction, and from dewatering activities associated with construction. Examples include; properly washing vehicles in contained areas, cleaning streets, and minimizing irrigation runoff.

Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

V. <u>DOCUMENT CHECKLIST</u> (Please check each item to verify that the documents are attached)

☐ Did Authorized Discharge take place

☐ Did Unauthorized Discharge take place

☐ Form 2 Attached

☐ Form 3 Attached

Structural Best Management Practices Housekeeping for Non-Visible Pollutants	**BMP Conditions E, NM, N/A YES OR NO**	**Actions Taken or BMPs Added**
Drainage Areas		
Free of Floating & Suspended Material		
Free of Sheen/Discoloration		
Free of Turbidity		
Free of Odor		
Construction Materials Storage Areas		
Materials Properly Stored		
Pollutants Covered		
Pollutants Bermed		
Construction Waste Management		
Containment Stockpiled Waste		
Containment Sanitary Facilities		
Containment Waste Watertight Containers		
Vehicle Storage/Fueling/Spill Prevention		
Fueling Procedures/Designated Areas		
Vehicle Storage with Containment		
Spill Kit Onsite		
Concrete Residuals & Washouts Wastes		
Properly Placed Washout		
Secondary Containment		
Landscape Materials		
Stored Away from Flow Lines		
Containment Fertilizers/Soil Amendments		
Secondary Containment Plants		
Observations/Comments:		

E-EFFECTIVE N/M-NEEDS MAINTENANCE N/A-NOT APPLICABLE
YES or NO

Attachment "F" (Cont.)

REPORT – PART A FORM 2 QUARTERLY VISUAL OBSERVATIONS OF AUTHORIZED NON STORM WATER DISCHARGES (NSWDs)

- Quarterly dry weather visual observations are required of each authorized NSWD.
- Observe each authorized NSWD source, impacted drainage area, and discharge location.
- Authorized NSWDs must meet the conditions provided in Section D (pages 5-6), of the General Permit.
- Make additional copies of this form as necessary.

QUARTER: **JULY-SEPT.** DATE: _	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** **YES** ☐ If **YES**, complete Part B of this form. **NO** ☐
QUARTER: **OCT.-DEC.** DATE: _	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** **YES** ☐ If **YES**, complete Part B of this form. **NO** ☐
QUARTER: **JAN.-MARCH** DATE: _	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** **YES.** ☐ If **YES**, complete Part B of this form. **NO** ☐
QUARTER: **APRIL-JUNE** DATE: _	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER? NO** **YES** ☐ If **YES**, complete Part B of this form. **NO** ☐

Attachment "F" (Cont.)

REPORT
FORM 2 – QUARTERLY VISUAL OBSERVATIONS OR AUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

DATE/TIME OF OBSERVATION	SOURCE AND LOCATION OF AUTHORIZED NSWD Example: Air conditioner Units on Building C	NAME OF AUTHORIZED NSWD Example: Air conditioner condensate	DESCRIBE AUTHORIZED NSWD CHARACTERISTICS Indicate weather authorized NSWD is clear, cloudy, or discolored, causing staining, contains floating objects or an oil sheen, has odors, etc.		DESCRIBE ANY REVISED OR NEW BMP's AND PROVIDE THEIR IMPLEMENTATION DATE
			At the NSWD Source	At the NSWD Drainage Area and Discharge Location	
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					

REPORT – PART A FORM 3 QUARTERLY VISUAL OBSERVATIONS OF UNAUTHORIZED NON STORM WATER DISCHARGES (NSWDs)

- Unauthorized NSWDs are discharges (such as wash or rinse waters) that do not meet the conditions provided in Section D (pages 5-6) of the General Permit.
- Quarterly visual observations are required to observe current and detect prior unauthorized NSWD.
- Quarterly visual observations are required during dry weather and at all facility drainage areas.
- Each unauthorized NSWD source, impacted drainage area, and discharge location must be identified and observed.
- Unauthorized NSWDs that can not be eliminated within 90 days of observation must be reported to the Regional Board in accordance with Section A.10.e of the General Permit.
- Make additional copies of this form as necessary.

QUARTER: **JULY-SEPT.** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐ If **YES**, complete Part B of this form.
QUARTER: **OCT.-DEC.** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐ If **YES**, complete Part B of this form.
QUARTER: **JAN.-MARCH** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐ If **YES**, complete Part B of this form.
QUARTER: **APRIL-JUNE** **DATE/TIME OF OBSERVATIONS** ☐ **AM** ☐ **PM** _____ _	**Observers Name:** _ **Title:** **Signature:**	**WERE ANY AUTHORIZED NSWDs OBSERVED?** **YES** ☐ **NO** ☐ **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NAWDS?** **YES** ☐ **NO** ☐☐ If **YES**, complete Part B of this form.

Attachment "F" (Cont.)

REPORT
FORM 3 – QUARTERLY VISUAL OBSERVATIONS OR UNAUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

OBSERVATION DATE (FROM REVERSE SIDE)	NAME OF UNAUTHORIZED NSWD Example: Vehicle Wash Water	SOURCE AND LOCATION OF AUTHORIZED NSWD Example: NW Corner of Parking Lot	DESCRIBE UNAUTHORIZED NSWD CHARACTERISTICS Indicate weather unauthorized NSWD is clear, cloudy, or discolored, causing stains, contains floating objects or an oil sheen, has odors, etc.		DESCRIBE CORRECTIVE ACTIONS TO ELIMINATE UNAUTHORIZED NSWD AND TO CLEAN IMPACTED DRAINAGE AREAS. PROVIDE UNAUTHORIZED NSWD ELIMINATION DATE
			AT THE UNAUTHORIZED NSWD SOURCE	AT THE UNAUTHORIZED NSWD DRAINAGE AREA AND DISCHARGE LOCATION	
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					
_____ ☐ AM ☐ PM					

END OF SECTION

SECTION 01 33 01

SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Procedures for submitting to the Architect, shop drawings, product data, samples, and material lists required by specification section and procedures for submitting hardware lists to the District.

1.02 RELATED SECTIONS:

A. Section 01 32 00: Schedules and Reports.

B. Submittal of guarantees, warranties, certificates, operation and maintenance manuals and as-built drawings: Section 01 77 00, Project Close-Out.

C. Submittals: See Respective Specification Sections.

1.03 PROCEDURES:

A. At the start of the project the Contractor shall review the documentation required for Project Completion. This shall include documentation requested by the Architect: Shop drawings, manufacturer's catalogs, samples, warranties, operation and instruction manuals.

B. The Contractor shall, during the course of the project, secure, review and approve, and submit the required documentation to the Architect for review and approval.

C. After the Architect has date-stamped, signed and reviewed the submittals, with corrections noted if any, the Architect will transmit submittals to Contractor and if not rejected, to the District Inspector.

1.04 CONTRACT:

A. Furnish simultaneously the following number of executed copies of:

1. Agreement: Five (5).

2. Performance Bond: Five (5).

3. Payment Bond: Five (5).

4. Certificate - Workmen's Compensation: Six (6).

5. Certificates showing "Proof of Carriage of Insurance" required by General Conditions: Six (6).

6. Non-Collusion Affidavit: Six (6).

1.05 SUBMITTALS; GENERAL:

A. Deliver all submittals to the Architect. Identify project name and address, telephone number of Contractor, subcontractor and supplier. Identify, as appropriate, the pertinent drawing sheets, detail numbers and Specification Section numbers. Clearly identify any deviations from contract documents. Number submittals using the appropriate specification section, and a hyphen, then the number of the submittal, in sequence.

B. Make submittals in accordance with approved Construction Schedule in sequence that avoids delaying work and the progress of other Contractors.

C. Contractor shall thoroughly review; make coordination corrections, date and sign submittals prior to transmitting to Architect, specifically noting relative deviations from the Contract Documents.

D. Timing of Submittals:

1. Contractor shall submit required submittals in a timely manner, according to the construction schedule, allowing time for the Architect and related MEP or Structural Engineer's, or DSA Inspector's review, for the project and/or each respective Phase of Construction.

2. Contractor shall submit ALL required submittals for the project/phase not less than thirty-five (35) calendar days before the product/material is required for inclusion in the construction of the project beginning with the District's Notice to Proceed. Failure to meet the 35 day requirement shall result in a $160.00 per calendar day for each submittal not submitted in order to compensate for any necessary expedited review by A&E/Inspector. Submittals shall be complete and shall meet the requirements of the Contract Documents or they shall be considered invalid and the penalty shall apply. The contractor shall submit submittals earlier than the 35 day requirement if the project schedule requires. The contractor shall allow for the Architect's contract review time in order to return the Submittal to the contractor. The Submittals shall be related to the work progress, and shall be so organized as to allow sufficient time for mailing, reviewing, corrections, resubmission and re-reviewing.

3. The Contractor shall coordinate the submittal of related items with their respective sub contractors.

3. In scheduling, allow at least ten (10) full working days for Architect's review following receipt of the submittal. For Mechanical, Plumbing, Electrical, Structural and other submittals that require joint review, allow a minimum of fifteen (15) full working days following receipt of submittal.

E. Each submittal shall be accompanied by a letter of transmittal containing a complete itemized and numbered list of the submitted materials. Separate letters of transmittal shall accompany each submittal from different specification sections.

F. Resubmission: If requested, resubmit submittals in a timely manner. Resubmit as specified for initial submittal but identify as such with a sequential alphabetical character. Indicate any changes that have been made other than those requested by Architect.

1.06 SUBSTITUTIONS:

A. Contractor shall provide specified manufacturer's products unless:

1. Specified product cannot be delivered without project delay, or.

2. Specified product has been discontinued, or,

3. Specified product has been replaced by superior product, or

4. Specified product cannot be guaranteed as specified, or

5. Specified product will not fit within designated space, or

6. Substitution otherwise determined by the District to be in its best interest.

B. Contractor shall submit request for substitutions in accordance with the General Conditions.

1.07 SHOP DRAWINGS:

A. Shop Drawings are original drawings prepared by the Contractor, subcontractor, supplier, or distributor, which illustrate some portion of the work by showing fabrication, layout, setting, or erection details. Reproductions in whole or in part of the contract drawings shall not be part of the shop drawings.

B. Make shop drawings accurately to scale and sufficiently large to show all pertinent assembly features and methods of connection.

C. Copies Required and Distribution: Unless otherwise indicated, submit six (6) sets of drawings, and one electronic copy of the shop drawings in pdf. The Architect will retain two sets, two will be returned to the Contractor, one to the District Project Manager and, one to the District Inspector. In some cases, contractor will be required to submit more than six copies. In such cases the actual number of sets required shall be as stated in the individual specification sections.

1.08 PRODUCT DATA:

A. Manufacturer's Standard Schematic Drawings:

1. Delete information, which is not applicable to Project. Failure to do so shall be grounds for rejecting the entire submittal.

2. Supplement standard Drawings to provide additional information applicable to Project.

B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data:

1. Clearly mark each copy to identify pertinent materials, products, or models in terms of this contract.

2. Delete information, which is not applicable to Project. Failure to do so shall be grounds for rejecting the entire submittal.

3. Show dimensions and clearances required.

4. Show performance characteristics and capacities.

5. Show wiring diagrams and controls.

C. Copies Required and Distribution: Submit six (6) copies and one electronic copy in pdf. The Architect will retain two copies, two will be returned to the Contractor and two to the District Inspector.

1.09 SAMPLES:

A. Samples:

1. Submit samples of sufficient size and quantity to clearly illustrate:

a. Functional characteristics of product or material, with integral parts and attachment devices.

b. Full range of colors, textures, and patterns as required by this contract.

2. Provide permanent identification for each sample.

3. Color and pattern: Whenever a choice of color or pattern is available in a specified product, submit accurate color chips and pattern charts to the Architect for review and selection.

4. Number Required: Submit four of each. Architect and District will retain one each, one will be returned to the Contractor and one to the District Inspector. Additional samples shall be provided Architect at no cost for sample color boards if requested.

B. Field Samples and Mockups: When specified, erect field samples and mock-ups at the project site to illustrate materials, equipment, or workmanship and to establish standards by which completed work is judged.

C. After return of office samples or review of field samples, these items may be used in the construction of the project with the approval of the Architect.

1.10 COLOR SCHEDULES:

A. Following appropriate submittals by the Contractor, the District shall review and approve the color schedules prepared by the Architect, who will distribute the approved schedules to the Contractor and District Inspector.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 35 00

SPECIAL PROJECT PROCEDURES

PART 1 – MANAGEMENT PLAN

1.1 REQUIREMENTS OF THE IAQ MANAGEMENT PLAN

A. During construction, meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ guidelines for Occupied Buildings under Construction, 1995, Chapter 3.

B. Protect stored on-site or installed absorptive materials from moisture damage. Sources of moisture contamination include precipitation, air intakes, cleaning procedures, flushing procedures, testing procedures, leaks, etc. The approach for preventing moisture-related problems is to identify all sources of moisture and to keep materials from getting wet. Porous or absorptive materials including insulation, ceiling tiles, carpeting, etc. that become damp or wet shall be dried immediately; and any of these materials that remain wet or damp for more than 4 hours shall be replaced with new materials. An exception to this made be made at the owner's discretion with respect to carpet tile. In this case, if found wet, the carpeting may be re-used if it is immediately professionally cleaned, sanitized and vacuumed so that it is dry within 4 hours of cleaning. Also, any materials found to have mold or mildew odors shall be replaced with new materials. This is the responsibility of All Contractors.

C. If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999

D. Replace all filtration media immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value of 13, as determined by ASHRAE 52.2-1999 for media installed at the end of construction.

E. Provide cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted.

F. Provide photographs of construction IAQ management measures such as protection of ducts and onsite stored or installed absorptive materials.

G. The IAQ Management Plan is a requirement to comply with Pre-requisite HPI-CHPs point EQ2.0A Minimum HVAC and Construction IEQ Requirements and Moisture Control.

PART 2 - MANAGEMENT PLAN SMACNA GUIDELINES

2.1 HVAC PROTECTION

A. The most significant potential IAQ contamination sources from construction are dust, moisture and Volatile Organic Compounds (VOCs). The approach for preventing dust-related problems is to identify all sources of dust and protect the HVAC systems. During construction, the return air system openings shall have temporary filters (min. MERV 8) that receive frequent periodic maintenance if the HVAC system is being utilized. When activities that produce high dust levels are occurring such as drywall sanding, masonry work, wood sawing, and insulating, the return system openings shall be sealed off completely for the duration of the task. This activity is the responsibility of the General Contractor and subcontractors.

B. The use of ventilation systems and air movers during construction shall be limited to 100% outside air (not re-circulating).

C. When the HVAC system is needed during construction operations, the supply system openings shall be covered with a particulate filter to prevent dust migration back up the supply side. This activity is the responsibility of the General Contractor and subcontractors.

D. If the HVAC is not used at times during construction, the supply and return air system openings shall be sealed off to prevent the migration and accumulation of dust and debris in the duct system. The diffusers (if installed) should also be sealed with plastic and low adhesion masking tape. This activity is the responsibility of the General Contractor and subcontractors.

E. Uninstalled ductwork and equipment must be stored away from dust-producing areas. Terminal units must be wrapped in plastic. Ducts sections must have ends capped with plastic. For installed ducts and equipment, provide protective caps at open ends. This is the responsibility of the Mechanical Contractor.

F. Filtration is critical during construction and during startup of the HVAC system. Filter media must meet the ASHRAE requirement for MERV Level 8. This is the responsibility of the Mechanical Contractor.

G. An HVAC system is determined to have excessive dust or debris when an accumulation of particles can be observed under (not on) diffusers, or ventilation is restricted. The General Contractor, Mechanical Contractor, Design Team and Bond Manager shall monitor the condition of the ducts during the construction process by periodic inspection to ensure that they are kept clean. If the ducts are found to be contaminated due to inadequate protection, the ducts shall be cleaned. The Commissioning Agent shall have the final authority as to the determination of the presence of excessive dust or debris and the adequacy of any cleaning operations.

H. For documentation that the above guidelines are followed during the construction phase of the project, pictures shall be taken bi-weekly by the General Contractor.

I. No storage shall be allowed in any mechanical rooms in the building, and any of these rooms requiring access by the contractor shall be kept neat and clean.

J. Replace filtration media immediately prior to occupancy. See specification for requirements. This is the responsibility the Mechanical Contractor.

2.2 SOURCE CONTROL

A. Use of low or no VOC products as indicated by the specifications shall be utilized to reduce potential problems. This activity shall be verified and checked by the General Contractor. Subcontractors are responsible for ensuring their products meet the requirements in the specifications.

B. During activities such as staining or finishing the General Contractor shall use large air movers (fans) to create immediate cross ventilation and constant fresh air.

C. No gasoline or diesel equipment shall be permitted into the building. Any cutting, drilling, or other activity shall be done with electric powered equipment or the machinery shall be located outside away from any doors or operable windows in the area. Subcontractors shall be responsible for coordinating these activities with the General Contractor.

D. No smoking shall be allowed in the onsite at any time. Subcontractors shall be responsible for taking their smoke breaks when normal break times occur and then only off the job site. Smoking is only permitted across 21st Avenue in the empty lot.

E. Containers of wet products are to be kept closed when not in use.

2.3 PATHWAY INTERRUPTION

A. At the "link" connection between the addition and the existing Elementary School infection control procedures shall need to take place in order to not contaminate the occupied space. This shall require the construction of temporary walls to separate the construction area from the occupied area. Utilization of pressure differentials between the construction area and the occupied areas shall be needed to prevent contaminated air from entering clean areas. This shall also require ventilating using 100% outside air to exhaust contaminated air directly to the outside during installation of VOC-emitting materials.

B. Scrubbers shall be required with the use of equipment in the courtyard area if there are any operable windows or air intakes near.

2.4 HOUSEKEEPING

A. Institute cleaning activities concentrating on HVAC equipment and building spaces to remove contaminants from the building prior to occupancy. All coils, air filters, and ductwork should remain clean during installation and should be cleaned prior to performing the testing, adjusting and balancing of the systems. This activity is the responsibility of the Mechanical Contractor.

B. The work area shall be vacuumed on a weekly basis, with a dual filter vacuum. This activity shall be the responsibility of the General Contractor.

C. Suppress dust with wetting agents or sweeping compounds. Use an efficient and effective dust collecting method such as a damp cloth, wet mop, or vacuum with particulate filters. Activities which produce high dust levels shall be cleaned up immediately upon completion or at the end each day the activity continues. This is the responsibility of all contractors.

D. Spills or excess applications of solvent-containing products must be removed immediately. This is the responsibility of all contractors.

E. All walls shall be dusted prior to application of finishes. This shall be the responsibility of the Painting Contractor.

F. All of the stud tracks are to be vacuumed prior to installation of insulation. This is the responsibility of the General Contractor.

G. Provide photographs during construction of the above activities to document compliance. This is the responsibility of the General Contractor to coordinate.

H. Building materials shall be stored in a clean area prior to unpacking for installation.

I. Materials which become contaminated through direct exposure to moisture from precipitation, plumbing leaks or condensation shall be replaced.

2.5 SCHEDULING

A. The primer and first coat of paint must be installed on all surfaces prior to the installation of carpet and ceiling tiles.

B. Only extremely low-VOC paint (5 g/L or less) may be installed after absorptive ceilings and floorings are installed.

C. All materials to be stained shall be stained off-site, with the exception of wood slat ceiling. Items to be stained on-site must be finished prior to installation of absorptive ceilings and floorings.

D. Move in shall not occur until after TCO is achieved. Completion of punch list items which shall not cause significant VOCs, dust or other contamination of the

space may occur after occupancy only as necessary and as approved by the tenant.

2.6 MONITORING

A. Monitoring of the IAQ Plan shall be the responsibility of the General Contractor.

B. Contractor site coordination meetings are held weekly. At these meetings, the appropriate components of the IAQ Management Plan shall be reviewed as a regular action topic and the implementation of the plan shall be documented in the minutes of the meeting.

2.7 FLUSH-OUT AND/OR TESTING

A. Flushing out the building with 100% outside air will help remove indoor pollutants prior to occupancy. After construction ends, and with all interior finishes installed, flush-out the building by supplying continuous 24 hour ventilation with all air handling unit dampers at their maximum outdoor air position and all supply fans at their maximum position and maximum rate for at least 14 days while maintaining an internal temperature at the most energy efficient temperature above 60°F, and relative humidity no higher than 60%.

B. For the case where a potential CHPS project has fallen behind schedule and may be unable to complete all of the 14 day flush out prior to planned school occupancy date, the school may alternatively conduct the flush-out while the building is occupied provided all of the following measures to protect building occupants are taken:

1. All of the room's in the school must be inspected for health and thermal comfort by a trained technician or a certified Industrial Hygienist before occupancy. And the occupancy evaluation report which has been reviewed and approved by a certified Industrial Hygienists (i.e. certified by the American Council of Government and Industrial Hygienists (ACGIH)) shall be submitted to CHPS showing the following elements have been met at a minimum:

a) Each classroom has been tested to show that the ventilation rate meets minimum code required ventilation rate and receives continuous ventilation during occupancy, per Title 8, Sec. 5142.
b) The HVAC filters on all HVAC units are properly in place and meet the MERV rating (minimum MERV 8) as specified for the CHPS school project, the HVAC condensate pans drain correctly and the internal HVAC insulation is undamaged.
c) Each classroom has been tested to show that the particulate matter, PM 10, has been measured to be 20 micrograms per cubic meter or less than the outdoor levels and the PM 2.5 12 micrograms per cubic meter or less than outdoor levels
d) Each classroom has been tested to show that the carbon monoxide

has been measured and is less than 9 parts per million but not greater than 2 ppm above outdoor levels.

e) Each classroom has been tested to show that the carbon dioxide has been measured and is less than 200 ppm above outdoor CO 2 levels nearby. The room must be unoccupied during testing, and testing should occur during at least one rush-hour period.

f) Each classroom has been tested to show that the temperature and relative humidity have been measured and are within the criteria in ASHRAE Standard 55-2007.

g) Each classroom has been inspected and observed to ensure that there are no health or safety concerns from any chemical, moisture and odor sources in or near the classrooms.

PART 3 - CONCLUSION

The construction process is traditionally an indoor air polluting activity and often results in the contamination of buildings during construction as well as continued contamination after the building is occupied. The HVAC systems are especially prone to contamination from construction particulate matter that contains dust, VOCs, microorganisms and other contaminants. These contaminants can remain in the HVAC systems for years after occupancy. This plan's approach is to identify and document activities present on the site and reduce IAQ problems from dust, moisture and VOCs. Therefore, the strategies and activities outlined above in this plan minimize the construction contamination prior to building occupation.

END OF SECTION

SECTION 01 40 00

REFERENCES

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. General requirements for reference standards pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.02 REFERENCE AND STANDARD TYPE SPECIFICATIONS:

Specifying by reference to a reference and standard type specification document or to another portion of the Contract Documents shall be the same as if the referenced document or portion of the Contract Documents referred to were exactly repeated at the place where such reference is made. In case of a conflict between the requirements of regulatory agencies and the referenced and standard type specification documents, Contractor shall conform to the most restrictive requirement if such conformance is legal.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

SECTION 01 40 50

OBSERVATION OF WORK

PART 1-GENERAL

The District will provide a Project Inspector, or Inspector of Record (IOR) for this project.

Contractor shall submit an Inspection Request Form to the Project Inspector (IOR) at least 48 hours prior to the time the inspection is needed, and on the form required. Contractor shall not cover any work requiring inspection until the Project Inspector (IOR) has inspected and approved the subject work.

For work not in conformance with the Contract Documents, the Project Inspector (IOR) shall submit to the Contractor a Deviation/Nonconforming Notice.

PART 2- PRODUCTS - NOT USED

PART 3 – EXECUTION - NOT USED

END OF SECTION

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SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTIION INCLUDES:

A. Regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.02 REQUIREMENTS OF REGULATORY AGENCIES:

All pertaining statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction of the Work are hereby incorporated into these Contract Documents the same as if repeated in full herein and such are intended where any reference is made in either the singular or plural to Code or Building Code unless otherwise specified including, without limitation, those in the list below. Contractor shall make available at the site such copies of the listed documents applicable to the Work as the Architect or Owner may request including mentioned portions of the California Administrative Code (CAC).

A. With respect to the Division of the State of Architect and State Fire Marshal, Uniform Building Code, most-recent adopted Edition.

B. Building Standards Administrative Code, Part 1, Title 24 C.C.R.. latest Edition.

C. California Building Code (CBC), Part 2, Title 24, C.C.R. (Uniform Building Code volumes 1-3 and California Amendments) Latest Editions.

D. California Electrical Code (CEC), Part 3, Title 24, C.C.R. (National Electrical Code and California Amendments) Latest Editions

E. California Mechanical Code (CMC), Part 4, Title 24 C.C.R. (Uniform Mechanical Code and California Amendments) Latest Editions

F. California Plumbing Code (CPC), Part 5, Title 24 C.C.R. (Uniform Plumbing Code and California Amendments) Latest Editions

G. California Fire Code, Part 9, Title 24 C.C.R. (Uniform Fire Code and California Amendments) Latest Editions.

H. California Referenced Standards, Part 12, Title 24, C.C.R., Latest Edition

I. California Energy Code, Part 6, title 24, C.C.R., Latest Edition

J. Title 19 C.C.R. Public Safety, State Fire Marshal Regulations, Latest Editions and Amendments

K. State and Local Public Health Codes, Latest Editions and Amendments

L. Other statutes, ordinances, laws, regulations, rules, orders, and codes specified in other Sections of the Specifications or bearing on the Work.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

SECTION 01 42 00

TESTING AND INSPECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Testing and inspection services to meet requirements of the California Building Code (CBC), Title 24, Parts 1 and 2, as indicated on the Drawings.

B. Tests of materials are required by a DSA certified testing agency as set forth in Section 4-335 of the California Building Standards Administrative Code.

1.2 RELATED SECTIONS

Provisions of the General Conditions, Supplemental Conditions and Division 01 apply to this Specification. Specifications that are referenced or related may include:

A. Section 01 31 00: Project Coordination

B. Section 01 73 29: Cutting and Patching

C. Section 01 33 00: Submittals

D. Section 01 32 00: Construction Schedule

E. Section 01 50 00: Construction Facilities and Temporary Controls

F. Section 01 77 00: Project Closeout

G. Section 01 78 23: Warranties

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 TESTS

A. OWNER will select and provide an independent DSA certified testing agency (the agency) to conduct tests, sampling, and testing of materials. Selection of material to be tested shall be by the agency and not by CONTRACTOR.

B. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection, or prior to the receipt of notice from IOR such testing and inspection is not required, shall not be incorporated into the Work.

C. OWNER will select, and directly reimburse, the agency for costs of all DSA required tests and inspections; however, the agency may be reimbursed by

CONTRACTOR for such costs as specified or noted in related sections of the Contract Documents.

D. The independent testing agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

E. The agency shall not perform any duties of CONTRACTOR.

F. CONTRACTOR shall provide an insulated curing box with the capacity for twenty (20) concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

3.2 TEST REPORTS

A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Drawings. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

1. The test reports shall incorporate all requirements of Title 24 Part 1, Section 4-335(d).

3.3 VERIFICATION OF TEST REPORTS

A. Each testing agency shall submit to the Division of the State Architect, in duplicate, a verified report covering all tests required to be performed by that agency during the progress of the Work. Such report, covering all required tests, shall be furnished prior to Substantial Completion and/or, when construction on the Work is suspended, covering all tests up to the time of Work suspension.

1. The test reports shall incorporate all requirements of Title 24 Part 1, Section 4-335(e).

3.4 INSPECTION BY OWNER

A. OWNER, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. CONTRACTOR shall, at all times, maintain proper facilities and provide safe access for such inspection.

B. OAR shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises

and legally disposed of without charge to OWNER. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, OWNER may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.

C. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

3.5 INSPECTOR OF RECORD

A. A DSA approved and certified Inspector of Record (IOR) shall be employed by OWNER in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein. Additional DSA certified inspectors may be employed and assigned to the Work by OWNER in accordance with the requirements of California Building Standards Administrative Code with their duties as specifically defined in Section 4-333(b).

B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all terms and conditions of the Contract Documents.

C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

3.6 TESTS AND INSPECTIONS

The following tests and inspections do not limit inspection of the Work but are required by DSA, other agencies, or are required in related Sections of the Contract Documents.

A. Excavations, Foundations and Retaining Walls - CBC, Chapter 18A:

1. Inspection:

a. Excavation, Filling and Compaction	1701A.5.13

B. Concrete - CBC, Chapter 19A:

1. Materials:

a. Test of Materials	1903A.1; 1916A.1 – ACI 318
b. Portland Cement Tests	1903A.3; 1916A.1 – ASTM C 150
c. Concrete Aggregate	1903A.5 – ACI 318
d. Reinforcing Bars	1903A.7; 1916A.2 – ACI 318
e. Structural Steel, Steel Pipe or Tubing	ACI 318 Sec. 3.5.6
f. Admixtures	ACI 318 Sec. 3.6

2. Quality:

a. Proportions of Concrete	1905A.1; 1905A.2; 1905A.3; 1905A.4; 1905A.5; 1905A.6; 1905A.7 1904A.
b. Mixing and Placing	1905A.1.1; 1905A.2; 1905A.3, 1905A.4
c. Concrete Testing	1905A – ACI 318
d. Insulating Concrete Tests	1701A.5.9

3. Inspection:

a. Project Site Inspection	1704A
b. Batch Plant or Weigh-master Inspection	1704A.4.2; 1704A.4.3
c. Reinforcing Bar Welding Inspection	1704A.3.1.3

C. Aluminum - CBC, Chapter 20A:

1. Aluminum	2002.1
2. Inspection:	2003.1

D. Masonry - CBC, Chapter 21A:

1. Materials:

a. Masonry Units	2103A.1,2,3,4,5,6,7
b. Portland Cement	2103A.10.7
c. Mortar & Grout Aggregates	2103A.12
d. Reinforcing Bars	2103A.13

2. Quality:

a. Portland Cement Tests	2105A.1, 2105A.2
b. Mortar & Grout Tests	2105A.5
c. Masonry Prism Tests	2105A.3
d. Masonry Core Tests	2105A.4
e. Reinforcing Bars	2103A.13

3. Inspection:

a. Reinforced Masonry	1704A.5;1704A.5.3,
b. Reinforcing Bar Welding Inspection	1704A.3.1

E. Steel - CBC, Chapters 17A & 22A:

1. Materials:

a. Structural Steel & Cold Formed Steel	2202A.1; 2205A
b. Material Identification	2203.A

2. Inspection and Tests:

a. Test of Structural Steel	1704A.3; 2212.A
Table 1704A.3.	
b. Tests of High Strength Bolts,	1704A.3.3; 2212.A.1
c. Tests of End Welded Studs	1704A.3.1: 2212A.2
d. Shop Fabrication Inspection	1704A.3.2.1
e. Welding Inspection	1704A.3.1
f. High Strength Bolt Inspection	1704A.3.3
h. Spray applied fire resistance materials	1701A
i. Non-Destructive Items	1703A
j. End-Welded Studs Inspection	2212A.2

F. Exterior Wall Coverings - CBC, Chapter 14A, 25A:

1. Materials:

a. Portland Cement Plaster	2510

2. Inspection:

a. Veneer Inspection	1405A.4

END OF SECTION

SECTION 01 42 01

ABBREVIATIONS, SYMBOLS AND ACRONYMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section lists the abbreviations, symbols and acronyms used in these specifications.

1.02 ABBREVIATIONS:

ac	Alternating current
BTU	British thermal unit
cfh	Cubic feet per hour
cfm	Cubic feet per minute
cm	Centimeter
Co.	Company
COP	Coefficient of performance
Corp.	Corporation
d.	Penny
db.	Decibel
DB	Dry bulb
dc	Direct current
EER	Energy efficiency ratio
F	Degrees Fahrenheit
fpm	Feet per minute
gap	Gallons per hour
GPM	Gallons per minute
HP	Horsepower
HVAC	Heating, ventilating and air conditioning
Hz	Hertz
Inc.	Incorporated
KHz	Kilohertz
lb	Pound
LED	Light emitting diode
MBH	100 BTUs per hour
MHz	Mega hertz
mil	Thousandth of an inch
mm	Millimeter
mph	Miles per hour
oz.	Ounce
pH	Acidity-alkalinity balance
psf	Pounds per square foot
psi	Pounds per square inch
psig	Pounds per square inch, gauge
RF	Radio frequency

rpm	Revolutions per minute
V	Volt
WB	Web bulb
#	Number
'	Foot/Feet
"	Inch (es)
%	Percent

1.03 ACRONYMS:

ABMA	American Boiler Manufacturers Association
ABMS	American Bureau of metal Statistics
ABPA	American Board Products Association
ACI	American Concrete Institute
AGA	American Gas Association
AHAM	Association of Heating and Air Conditioning Manufacturers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
APA	American Plywood Association
AQMD	Air Quality Management District
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
CAC	California Administrative Code
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CQC	California Quality Control (CMA Standards)
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards, U.S. Department of Commerce
CTI	Ceramic Tile Institute
CTI	Cooling Tower Institute
DHI	Door and Hardware Institute

FCC	Federal Communication Commission
FGMA	Flat Glass Marketing Association
FM	Factory Mutual
FS	Federal Specifications
HPMA	Hardwood Plywood Manufacturers Association
IAMPO	International Association of Plumbing and Mechanical Officials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical & Electronic Engineers, Inc.
IES	Illuminating Engineering Society
IMI	International Masonry Institute
IRI	Industrial Risk Insurers
MIA	Marble Institute of America
MIA	Masonry Institute of America
MLSFA	Metal Lath/Steel Framing Association
MS	Military Specifications
MSS	Manufacturers Standardization Society of the Valve & Fittings Industry.
NAAMM	National Association of Architectural Metal Manufacturers
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NOFMA	National Oak Flooring Manufacturers Association
NPCA	National Paint and Coatings Association
NSF	National Sanitation Foundation
NTMA	National Terrazzo & Mosaic Association
NWMA	National Woodwork Manufacturers Association
OSA	Office of the State Architect
PCA	Portland Cement Association
PCI	Pre-stressed Concrete Institute
PDCA	Painting and Decorating Contractors of America
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PS	Product Standard, U.S. Department of Commerce
RCSB	Red Cedar Shingle and Hand split Shake Bureau
RIS	Redwood Inspection Service
RFCI	Resilient Floor Covering Institute
SCMA	Southern Cypress Manufacturers Association
SDI	Steel Deck Institute

SDI	Steel Door Institute
SFPA	Southern Forest Products Association
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractor National Association
SPIB	Southern Pine Inspection Bureau
SPR	Simplified Practice Recommendations, U.S.
SSPC	Steel Structure Painting Council
SWI	Steel Window Institute
TCA	Tile Council of America
UBC	Uniform Building Code
UCI	Uniform Construction Index
UL	Underwriters' Laboratories, Inc.
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
WCLIB	West Coast Lumber Inspection Bureau
WIC	Woodwork Institute of California
WWPA	Western Wood Products Association

END OF SECTION

SECTION 01 43 00

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. All inspection and testing required to establish compliance with Contract Documents and Title 24 CCR requirements, except as may be otherwise specified, shall be made by an independent professional testing agency or firm selected and paid by the Owner/District (or as otherwise noted). All work prior to the call out of the inspection services shall be approved by the Inspector of Record as ready for the inspection services.

B. The cost of most services for testing and inspection in compliance with Contract Documents requirements will be paid by the Owner. If initial tests indicate non-compliance with Contract Document requirements, any non-compliance testing shall be performed by the same inspection service and back charged to the General Contractor. Schedule portions of the work requiring testing and inspection services so that the time of the agency on the work is as continuous and brief as possible. Should an inspection service be called out without proper pre-inspection and approval by the Inspector of Record, and the Contractor causes the inspection service to be on site for longer than the minimum call-out costs, or the Contractor causes the inspection service to make a return call to the site for the same inspection, the additional costs shall be back-charged to the Contractor.

C. Concrete Coring Procedures: Prior to the start of any concrete coring, the Contractor shall submit a detailed coring plan, indicating the size and precise locations of the cores, for approval by the Architectural Team/Structural Engineer. Proposed coring locations must be marked in the field and verified by the District IOR. The project Architectural Team/Structural Engineer may also request to perform a field inspection if deemed necessary. The Contractor SHALL arrange for and bear the costs of all Pachometer tests of the areas to be cored.

1.02 CONTRACTOR'S RESPONSIBILITY

A. Coordination: The Contractor shall initiate and coordinate testing and inspections required by the Contract Documents and public authorities having jurisdiction over the work through the Architect and/or Inspector of Record.

B. Access: Furnish free and safe access to the various parts of the work and assist testing and inspection personnel in the performance of their duties at no additional cost to the Owner.

C. Data: Furnish records, drawings, certificates, and similar data as may be required by the testing and inspection personnel to assure compliance with the Contract Documents.

D. Notification: Provide the Architect and/or Inspector of Record and Testing Laboratory with at least 72 hours advance notification of required testing.

E. Defective work: Remove and replace any work found defective or not complying with Contract Document requirements at no additional costs to the Owner (shall apply to 1, 2, and 3 immediately below). Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance and as approved by the District IOR.

1. Concrete: If test cylinders for concrete fail to meet design stresses, make core and load tests as may be directed by the Design Professional; make core tests in accordance with an ASTM C42 or most recent update and load tests in accordance with ACI 318 or most recent update. Correct all deficiencies found in forms, reinforcing steel and embedded items.

2. Structural Steel: Should any weld or structural connection fail to meet design stresses, provide sonic or x-ray examination of all structural connections as directed by the Architect/engineer. Replace or repair all defective connections as directed.

3. Roofing membrane work: Should roofing membrane, including associated flashing and jointing, indicate non-compliance with Contract Document requirements, provide corrective work as directed.

F. Lead Levels in Water: The domestic water piping system shall be protected during tie-ins or other construction activities that have the potential to elevate the lead levels in the water. The water in the domestic water piping shall be tested prior to the start of work and the lead levels documented. Testing shall also be performed upon the completion of all work and any lead contamination, above the levels documented prior to the start of work shall be the Contractors responsibility to reduce the levels to the pre-project levels.

1. If the domestic water system is contaminated as a result of construction activities, the Contractor shall decontaminate the domestic water system. The procedures shall comply with applicable regulatory requirements.

1.03 TESTING LABORATORY RESPONSIBILITY

A. Taking Specimens: Specimens and samples for testing, unless otherwise provided in the Contract Documents, will be taken by the testing personnel. Sampling equipment and personnel will be provided by the testing laboratory. Deliveries of specimens and samples of the testing laboratory will be performed by the testing laboratory.

1. When the testing laboratory is ready to test, but is prevented from testing or taking specimens due to incompleteness of the work or other scheduling lapses, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

B. Test Reports: Reports shall include all tests made, regardless of whether such tests indicate that material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Reports shall state which requirements with which the material or materials were sampled and tested. Test reports shall show the indicated or specified design strength(s) and state definitely whether or not the materials tested comply with the specification requirements.

Report distribution shall be made as follows:

Owner's Rep	1 copy, and 1 electronic pdf
Architect	1 copy, and 1 electronic pdf
Structural Engineer	1 copy
Contractor	2 copies
DSA	2 copies (or as req'd by DSA)

C. The inspection agency shall cooperate with the Contractor so as to cause no delay in the progress of the work, but shall be directly responsible to the Owner for his actions. The inspection agency shall have no authority to direct the work of the Contractor.

D. Submittals: Promptly submit copies of reports of inspections and tests, mill analysis, concrete mix designs and certifications per applicable sections of the specification.

1. Comply with requirements of each technical specification section and DSA requirements.

2. Reports shall include all tests made, regardless of whether such test indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were samples and tested in accordance with the requirements of the Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements.

3. Testing Agency is not authorized to:

   a. Release, revoke, alter, or enlarge on, requirements of Contract Documents.

   b. Perform any duties of the Contractor.

1.04 REQUIRED INSPECTIONS & TESTS

The following are inspection services and tests required of but not limited to the Inspection and Testing Agency.

A. Sitework inspections & tests: Perform the following services as required to assure compliance with requirements of Division 2 of the technical specifications.

Compaction & bearing: Test and verify bearing capacity of all load bearing earth, test compaction fills for compliance with required densities.

B. Concrete work inspections & tests: Perform the following services as required to assure compliance with requirements of Division 3 of the technical specifications.

1. Cast-in-place concrete: Make slump tests for each batch delivered or at least 1 test per hour during continuous pours in accordance with requirements of ASTM C143; check and verify batch consistency. Inspect forms and verify sizes and conditions. Inspect reinforcing and verify its proper placement. Furnish continuous inspection during replacement, repair and patching operations, and curing of concrete. Make cure, and test at least 3 test cylinders of each strength, of concrete for each 50 cubic yards (38.23 m3) placed or for each day's pour, whichever is greater. Report exact mix tested, minimum size aggregate, location of pour in the work, cylinder identification, data of receipt of cylinder in laboratory, slump data, cement brand and type, admixtures used, dates and records offset cylinders, names of inspectors and laboratory personnel, and evaluation or analysis of cause, in case of test failure, and recommendations of remedial action.

2. Cure specimens under laboratory conditions except when there is possibility of surrounding air temperature falling at project below 40F. In this case, additional specimens will be required to be cured under job conditions. For all test unless otherwise directed, break 1 cylinder at 7 days, 2 at 28 days.

3. If 7 day tests appear to be marginal or fall below normal requirements, concrete shall be tested with an approved impact hammer. Should these readings verify low test cylinders, procedure of work beyond this point will be Contractor's responsibility until decision is reached as to removal of substandard concrete at each of 28 day period.

C. Metal work inspection & tests: Perform the following services as required to assure compliance with requirements of Division 5 of the technical specifications.

1. Structural steel fabrication: Furnish visual inspection of all shop fabricated parts including joists and joist girders. This inspection may be done in shop or in field after delivery. Furnish inspection and testing of shop welds in accordance with requirements for welding specification hereinafter. Check shapes, sizes, classes, and types of steel. Verify conformance of structural steel materials with requirements of Contract Documents. Test end welded studs, replace studs damaged by test.

2. Structural steel field inspection & tests: Check location and fit of all anchorage and inserts. Verify adjustments to fit inaccuracies. Furnish visual inspection of erection of all structural steel components of the work. Furnish inspection and testing of all field welding in accordance with requirements for welding in accordance with requirements for bolting specific hereinafter. Inspect and test all bolted connections in accordance with requirements for welding specified hereinafter. Inspect for compliance with AISC Code of Standard Practice with requirements of the Contract Documents; other duties and responsibilities as may be noted on drawing.

3. Welding requirements: Furnish visual inspection of all field fillet welding. Furnish inspection of fillet welds in accordance with requirements of AWS D1.1 (Rev. I): allow for inspection of a minimum of 15% of fillet welds by magnetic particle or dry penetrant methods

4. Bolting requirements: Furnish visual inspection of structural joints where ASTM A325 bolts are used; verify the applicable requirements of AISC specifications are met.

D. Thermal and moisture protection work testing & inspection: Perform services as required to assure compliance with requirements of Division 7 of the technical specification.

E. Roofing: Check deck surfaces prior to application of roofing materials and verify that substrate is in satisfactory conditions to receive roofing. Furnish continuous inspection during application of roofing, including application of vapor barriers, insulation and roofing. Inspect all sheet metal flashings, counterflashing and reglets for satisfactory and waterproof installation.

F. Wood: Check framing lumber moisture content prior to framing.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 45 00

SAFETY PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall ensure that all employees, visitors, subcontractors, subcontractor employees, and suppliers, while on the worksite, comply with the requirements of OSHA, these requirements, and the safety precautions contained in the several Specification Sections.

B. The Contractor shall promptly and fully comply with and execute, without separate charge thereof to the District, shall enforce compliance with the provisions of the Williams Steiger Occupational Safety Health Act of 1970 (Public Law 91-596 with most recent updates and amendments) with particular attention paid, but not limited to, Title 29-Labor, Chapter XVII - Occupational Safety and Health Administration, Department of Labor Part 1926 - (Safety and Health Regulations for Construction), and part 1910 - (Occupational Safety and Health Standards), as printed, respectively, in the June 24, 1974, and June 27, 1974, Federal Register, and latest adopted amendments and changes thereto.

1.02 PRELIMINARY WORK

A. Prior to the start of and during the course of the work (above and below ground) the Contractor shall make a thorough survey of the entire worksite to determine all potential hazards. Workmen shall be made aware of those hazards and shall be instructed in procedures and the use of equipment for their protection. The Contractor shall verify the location and condition ("live" or "dead") of all utilities on and near the worksite and take precautions to protect his employees, subcontractors, material men, the general public, and the property.

1.03 IMMINENT DANGER

A. The District may stop those operations which create an imminent danger to employees (as defined by OSHA), to the public and to property.

B. The Contractor shall be wholly responsible for any accident (including death) occurring at any time during the progress of the work and until the final acceptance of the work by the District which may happen to any of his employees/workmen or those of any Subcontractor employed on the building, the property, or for any damage or injuries (including death) which his work and operations may cause to the work being constructed, or to existing buildings, or to any tenants and occupants of the property, or of the adjoining properties, or to the public, or to any public or private property.

1.04 COOPERATION:

A. The Contractor shall cooperate with the safety representatives of the District, District's Insurance Managers and the District's Insurance Company in any and all inquiries before, during, and after the project.

1.05 SAFETY RESPONSIBILITIES:

A. Contractor's Superintendent shall:

1. Ensure compliance with these requirements, OSHA requirements and other safety requirements, and provide and implement an Injury and Illness Prevention Program (IIPP) at the project site.

2. Provide, supervise, and support a Contractor's Project Safety Supervisor and enable him/her to execute effectively their duties and responsibilities.

3. Authorize immediate action to correct substandard safety conditions.

4. Review and act to ensure compliance with safety procedures with his supervisors, subcontractors and suppliers.

5. Take an active part in all supervisory safety meetings.

6. Cooperate with safety representatives of the District, District Insurance Managers, and the District's insurance company.

7. Ensure that all security and temporary fencing has been secured to prevent any movement or causal action that could contribute to any hazardous or unsafe condition, or which ultimately may cause harm.

B. Contractor's Project Safety Supervisor shall:

1. Make thorough daily safety inspections of the worksite and immediately act to eliminate unsafe acts and unsafe conditions, and record all suggestions make and corrective action taken.

2. Investigate worksite accidents and recommend immediate corrective action.

3. **Weekly safety meetings shall be conducted and documented in the daily report of activity by the contractor. Weekly safety meeting notes shall be recorded, noting the contractors and trades on site, the topics that were discussed and the attendance by contractor name, workmen name and trade, in attendance on the project that day.**

4. Review safety meetings reports submitted by job foremen and act to ensure that meaningful weekly safety meetings are held by the job foremen.

5. Attend foremen "tool box" safety meetings and evaluate effectiveness.

6. Assist in the preparation of accident investigation and reporting procedures.

7. Implement training programs for supervisors and employees as they apply to their specific responsibilities.

8. Be responsible for the control, availability, and use of safety equipment, including employee personal protective equipment.

9. Coordinate his activities with those of the District's Inspector and/or Project Manager, and immediately implement their safety suggestions.

10. Coordinate public relations aspects of the Contractor's safety program.

C. Contractor's Job Foreman shall:

1. Instruct workmen regarding safe work practices and work methods at the time workmen are given work assignments.

2. Furnish and enforce the use of personal protective equipment and suitable tools that are equipped with all the manufacturer's supplied safety features, and have not been altered in any way, for the job.

3. Continuously check to see that no unsafe practices and conditions are allowed to exist on this portion of the work.

4. Set a good example for his personnel.

5. Make a complete investigation of accidents to determine facts necessary to take corrective action to prevent a recurrence, and record the facts in a written report to accompany the daily report as set forth in the IIPP.

6. Promptly supply information for, or complete, an Accident Report and Investigation Form as directed by the Contractor Safety Supervisor and Contractor's Superintendent/Project Manager.

7. Hold weekly "tool box" safety meetings with his personnel to:

a. Discuss observed unsafe work practices and unsafe conditions.

b. Review the accident experience of his crew and discuss correction of the accident causes.

c. Encourage safety suggestions from his crew and report those suggestions to the Safety Supervisor.

8. Ensure that first aid is promptly administered to an injured employee.

9. Report immediately, to Contractor's Superintendent/Project Manager, or Safety Supervisor, any injuries, or violations of job safety and security.

D. Subcontractor's Job Superintendent shall:

1. Plan and execute his work so as to comply with the Construction Safety Program.

2. Furnish and enforce the use of personal protective equipment.

3. Attend supervisory personnel safety meetings schedule by the Contractor.

4. Schedule and attend weekly "tool box" safety meetings to be held by job foremen for all employees.

5. Report to the Contractor's Project Safety Supervisor or Contractor's Superintendent all observed unsafe conditions, unsafe practices, and violations of job security.

6. Cooperate with the District's safety representative.

1.06 CONTRACTOR'S SAFETY SUPERVISOR:

A. Contractor shall designate a full-time employee as Contractor Project Safety Supervisor.

B. Qualifications must be approved by the District. Supervisor shall:

1. Have heavy construction experience of not less than three (3) years, one of which must have been in a supervisory capacity.

2. Be familiar with job safety laws and regulations.

3. Have accident prevention experience.

C. Duties: Project Safety Supervisor shall conduct regular inspections of the work, shall ensure compliance with job safety requirements, shall maintain the Contractor's safety program IIPP on site and available for review by the District's Inspector and/or Project Manager and shall enforce safe practices, use of safety equipment and personal protective equipment, and other such activities as may be required by OSHA, the safety requirements, and the safety precautions contained in the several Specification Sections.

D. If the Project Safety Supervisor is not effective in executing the duties assigned him, the District may request, in writing, that the Contractor furnish a new Project Safety Supervisor.

E. If the Contractor desires to replace the Project Safety Supervisor, he shall so notify the District and the District's Insurance Managers, in writing and shall submit the name, experience and qualifications of the proposed Project Safety Supervisor for approval.

1.07 REQUEST FOR VARIANCES

A. Request for variances to deviate from OSHA requirements must follow the current established procedures by that Agency.

1.08 FAILURE TO COMPLY

A. If the Contractor fails to comply with the requirements of OSHA, the safety requirements, and the safety precautions contained in the Specifications Sections, or to provide an on-site IIPP, the District may modify or stop the work and portions thereof, until such failure is remedied. Willful and repeated failure to comply could result in the shutdown of the work, and portions thereof. No part of the time lost due to any such modification of operations or stop orders shall be made the subject of a claim for extension of time or for increased costs of damage by the Contractor.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Temporary utilities, construction trailers/facilities and project sign(s) which are to be provided and maintained by the Contractor.

B. Dust and noise control.

C. General temporary items including staging area for material delivery and safety and security lighting.

1.02 TEMPORARY UTILITIES:

A. Water:

1. Arrange for water with District Construction/Project Manager and install all necessary water lines, connections and metering devices for project, and upon completion of the work, remove such temporary facilities.

2. District will pay for all water needed for construction. Water conservation techniques are to be observed by all workmen. Contractor is to provide and maintain all water conveyance equipment, hoses, nozzles, hose bib connections, free from leaks, and equip all hoses with positive closing, hand-squeeze-type operating nozzles - - it is not permitted to operate a hose without a positive closing nozzle.

3. Provide suitable drainage system, subject to the approval of the Architect/Engineer and as indicated on the approved SWPPP, to carry construction waste water from site to an approved disposal location.

B. Electricity:

1. District will pay for all electricity needed for construction. Contractor is to arrange for and install all necessary temporary poles, wiring and metering devices and, upon completion of the work, remove such temporary facilities. Electricity conservation best management practices shall be observed by all workmen, and any unnecessary lighting, or electrical discharge shall be turned off at the end of each shift. Only safety lighting is allowed after each shift is concluded.

2. Furnish and install area distribution boxes, so located that the individual trades may use 100 foot maximum length extension cords to obtain

adequate power and work task lighting, at points where required for the work, for inspection and for safety.

3. Provide all electricity needed for construction including connections for construction equipment requiring power.

4. Lighting in the construction work area shall be sufficient to allow safe travel for workmen and the Architectural team during normal working hours of the project, and shall be shut down to conserve energy after normal construction working hours.

C. Natural Gas: The Contractor shall provide and install gas equipment and piping necessary to perform his work, and shall remove same upon completion of the work. **The Contractor shall pay for the Natural gas used in the work**.

D. Telephone/Communications/Data:

1. Make necessary arrangements and pay costs for installation and operation of telephone, communication, or data service to the Contractor's office at the site.

E. Use all means necessary to maintain temporary facilities and controls in proper and safe condition throughout progress of the work.

F. Make required connections to existing utility systems with minimum disruption to services in the existing utility systems. When disruption of the existing service is required, do not proceed without the Architect and/or Inspector's approval with at least 72 hours written request and approval. When required, provide alternate temporary service, should it be necessary as deemed by the Architect and/or Inspector, or Project Manager.

1.03 CONTRACTOR'S FACILITIES:

Contractor shall provide temporary offices, storage sheds, fencing, barricades, signage, hoists, scaffolds, railings and other facilities as required and specified. Installation and maintenance of such items shall be the responsibility of the Contractor.

A. Temporary Offices for Contractor, the District Project Manager and District Inspector of Record.

1. The contractor shall provide and maintain two trailers on the site for the duration of the project, up to and including the date the Certificate of Occupancy will be filed by the District with the Board of Education.

2. One trailer shall be for the use of the general contractor, and the other trailer shall be for the use of both the District Project Manager, and the District IOR.

2. Both trailers shall have ample headroom; shall be properly lighted, heated and ventilated, and supplied with air conditioning sufficient to properly heat and cool the trailer between 68 and 76 degrees Fahrenheit on any day during construction.

3. The trailer for the District Project Manager, and the District IOR shall have a minimum of two separate entrances with an office space for each separated by an interior wall and lockable door, and each space shall be provided with a telephone line, fax line, and high speed internet service, with a new or refurbished office desk at least 30" x 60" in size, with drawers that operate, with a drawer for miscellaneous office supplies, a drawer to accommodate 8 1/2 x 11 size file folders, one drawer to accommodate bulk office supplies, one new or refurbished office chair with casters, one new or refurbished side chairs with casters, a worktable or drawing table in sufficient size to lay out a full size set of project drawings, and one shelf at least 12" deep by 48" in length and secured for safely storing project specifications, project binders, and code books..

5. The Contractor shall provide temporary toilet facilities and wash sinks within close proximity (no more than 30 feet) to the trailer for the District Project Manager, and the District IOR, which facilities shall be maintained as recommended by the supplier and common industry standards.

3. The trailers, equipment and the furniture shall remain the Contractor's property. Contractor shall remove such property upon completion of the work and the filing of the Certificate of Occupancy by the District.

B. Sanitary Facilities:

1. The Contractor shall provide temporary toilet facilities which may consist of portable chemical toilets, and hand washing equipment. Number of toilets shall be based on number of workers with a minimum of 1 toilet facility per 10 workers. Placement of temporary toilet facilities shall be agreed upon at the site with the District Construction/Project Manager.

2. Toilet facilities shall be kept supplied with toilet paper, and kept in a clean and sanitary condition until completion of the work, and then be removed from the work site. Upon removal, that portion of the site shall be properly cleaned and graded/repaired.

C. Contractor's Security Barricade:

1. The Contractor shall erect the temporary security barricades for the purpose of defining construction lay-down areas, staging area and work zones. Temporary security barricades shall be provided on school site at exterior locations, and at building interiors, as necessary to provide a clear, obvious separation between school users and construction personnel. New or used material may be used.

2. Unless otherwise indicated or specified, barricade shall be constructed of 6'-0" high chain link fence material with T-post condition at bottom for stability, shall have top rails, and 6 gauge minimum wire support at the bottom, BLACK screen material securely attached to the chain link material. Space posts not to exceed 10 feet on centers. Posts shall be of the following nominal pipe dimensions: terminal, corner, and gate posts 2-1/2", line posts 2", with diagonal supports at each corner. Chain link fabric shall be not less than 13 gauge, 2" mesh, and in one width. Posts, fabric and accessories shall be galvanized. Some fencing may require terminal posts to be sunk in the ground, or with appropriately placed concrete footings, and/or may require sandbags for ballast, as determined by the Inspector and/or Project Manager.

3. Chain link fencing shall be free from barbs, icicles or other projections resulting from the galvanizing process, and shall be knuckle-knuckle. Fence fabric having such defects will be rejected even though it has been erected.

4. Gates shall be fabricated of steel pipe with welded corners, and horizontal and diagonal bracing as required to prevent flexing. Fabric to be attached to the frame at 12 inch centers. Provide all gate hardware of a strength and quality to perform satisfactorily until the barricade is removed upon completion of the work. Provide locks sufficient to secure the area, and that can be opened with one hand (e.g. combination locks).

5. At the completion of the work, remove barricade and concrete post footings from the site; backfill and compact fence footing holes by patching with like materials. Existing surface paving that is cut into or removed shall be patched and sealed to match the surrounding areas with like materials, and in the same finishes.

6. Contractor shall maintain all fencing and gates in good order on a daily basis, including the masking of graffiti as deemed necessary by the Inspector, and/or Project Manager, and shall secure the project fencing and gates at the end of every work day.

D. Other Enclosures:

1. Provide temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, and/or to allow for temporary heating and for necessary security.

2. Provide protective barriers that shall be at least 4' in height, and extend to protect all areas at tree drip lines, around plants and other improvements designated to remain, as determined by the Inspector and/or Project Manager and related specification sections.

E. Storage Yards and Storage Containers:

1. The Contractor shall fence and maintain storage yards in an orderly manner.

2. Provide steel storage containers, lockable, free from graffiti, and in good condition for materials and equipment that cannot be stored offsite or in a bonded and agreed-upon warehouse.

3. Exact location, size and access of storage yards and steel storage containers shall be approved by the District Construction/Project Manager.

4. Remove storage yards and containers as rapidly as progress of the work will permit.

1.04 REQUIRED SIGNS AT GATES

A. Contractor shall post at the work site signs not greater than twenty-five feet (25') apart at all gates stating "Authorized Personnel Only – Construction Area" and "No Parking – Fire Lane," as determined by the contract specifications and drawings, and/or as designated by the Inspector and/or Project Manager

1.05 HARD HAT SIGN:

A. Contractor shall post a sign at each gate and/or entry to any area of construction, identifying the job site as a "hard hat area". No person without a hard hat shall be allowed in the sections of the project under construction. This shall be the responsibility of the Contractor's Project Safety Inspector to enforce.

1.06 DUST AND NOISE CONTROL:

A. Throughout the entire construction period, Contractor shall maintain dust control by use of water or other environmental controls as may be approved by the Architect, Inspector, and/or Project Manager.

B. Noise Control: Muffle all equipment to a maximum of 85 Dba at 5' from equipment. Noise control is to be kept to a minimum to perform the operations of construction. NO Radios or projected sound will be allowed on the job site.

1.07 GENERAL ITEMS:

A. Staging areas for delivery of materials and equipment will be at locations designated by the drawings and specifications, and/or as approved by the Architect, Inspector, and/or Project Manager.

B. Safety and Security Lighting: Provide 5 foot candles outside.

C. Noise Control: Muffle all equipment to a maximum of 85 Dba at 5' from equipment.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 53 50

PROTECTION OF INSTALLED WORK

PART 1-GENERAL

1.01 REQUIREMENTS INCLUDED

A. Protection for Products, including District - Provided Products, After Installation.

B. Protection of Existing Utilities and Interference.

1.02 EXISTING UTILITIES

A. The known existing utilities are shown on the drawings in their approximate location and the Prime Trade Contractor shall exercise care in avoiding damage to these facilities as the Prime Trade Contractor will be held responsible for their repair if damaged. Hand excavation shall be utilized when digging in close proximity to existing utilities. The District's Architectural Team does not guarantee that all utilities or obstructions are shown or that the locations indicated are accurate.

B. No work shall be performed on energized electrical equipment unless scheduled with the District Inspector of Record. The District Inspector of Record reserves the right to specify specific conditions for all work involving energized high voltage electrical equipment, and its scheduled modification proposal.

C. If interferences occur at locations other than the general locations shown on the plans, and such utilities are damaged before their locations have been established, or create an interference, the Prime Trade Contractor shall notify the District's Construction/Project Manager and a method for correcting said interference shall be supplied by the District's Engineering representatives. Payment for additional work due to interferences not shown on the plans shall be in accordance with the General Conditions.

D. Drawings showing location of equipment, piping, etc., are diagrammatic and job conditions will not always permit their installation in location shown. When this situation occurs, bring to the District Architect's, and/or Inspector's attention immediately to determine relocation in joint conference.

E. Information shown relative to existing power and signal service is based upon available records and data but shall be regarded as approximate only. Minor deviations found necessary to conform to actual locations and conditions shall be made without extra cost to the District.

PART 2- PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 PROTECTION AFTER INSTALLATION

A. Adequately protect all installed equipment and materials until completion and acceptance by the Architect, Inspector, and Project Manager.

B. Protect installed products and control traffic in immediate area to prevent damage in subsequent operations.

C. Provide protective coverings at walls, projections, corners, and jambs, sills, and stiff openings in and adjacent to traffic areas.

D. Cover walls and floors of elevator cabs, and jambs of cab doors, when elevators are used by construction personnel. Protect elevator area until final acceptance.

E. Protect finished floors and stairs from dirt, wear, and damage:

1. Secure heavy sheet goods or similar protective materials in place, in areas subject to construction foot traffic, and/or material deliveries.

2. Lay planking or similar rigid materials in place, in areas subject to movement of heavy objects over existing surfaces.

3. Lay planking or similar rigid materials in place in areas where storage of products will occur.

F. Protect waterproofed and roofed surfaces:

1. Restrict use of surfaces for traffic of any kind, and for storage of products.

2. When an activity is mandatory, obtain recommendations for protection of surface from manufacturer. Install protection and remove on completion of activity. Restrict use of adjacent unprotected areas.

G. Restrict traffic of any kind across planted lawn and landscape areas through the use of temporary barricades, fencing, signage, and until final acceptance and maintenance period.

H. Care shall be exercised to prevent damage to adjacent facilities including walks, curbs, and gutters, etc. Where equipment will pass over these obstructions, suitable planking and protection shall be placed, and damaged facilities, due to the Contractor(s) operations, shall be removed and replaced at the Prime Trade Contractor's expense.

I. Prime Trade Contractor shall be responsible for overloading of any part or parts

of structures beyond their safe calculated carrying capacities by placing of materials, equipment, tools machinery or any other item thereon.

J. All existing improvements and facilities shall be protected from damage of any type resulting from the operations, equipment or workers of the Contractor(s) during the time the project.

K. All damaged work shall be replaced, repaired and restored to its original condition with no additional cost to the District.

L. Where existing utilities are damaged or disrupted on account of any act, omission, neglect or misconduct by the Contractors in the manner or method of executing the work, or due to non-execution of work, such damage shall be immediately repaired to maintain operation regardless of the time of occurrence with no cost to the District.

M. Provide temporary construction necessary for protection of the building and their parts. Close buildings as soon as possible as protection from the weather and vandalism. Protect existing buildings and controlled temperature areas from excessive temperature variances below 68 degrees Fahrenheit, and above 76 degrees Fahrenheit, and from any damage.

N. Protect doors, millwork and mill counters and cases and hardware from damage, including abrading and scratching of finishes.

O. Protect doors and frames and hardware from mechanical damage and damage to finish coatings.

P. Remove protective coatings, wrappings, temporary coverings, etc., as required to leave work in condition for painting and finishing, final cleaning, etc.

Q. Protect all exterior work, including existing asphalt paving, concrete flatwork, common sidewalk, and City curb, gutter, and aprons. Protect all existing and newly placed landscaping and irrigation systems.

R. Repair or replace all damaged work promptly as directed by District Construction/Project Manager, District IOR, or District Architect at no cost to the District.

END OF SECTION

SECTION 01 54 00

SECURITY

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Security Program.

B. Entry Control.

C. Personnel Identification.

D. Miscellaneous Restrictions

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 SECURITY PROGRAM

A. Protect work, existing premises, and School operations from theft, vandalism and unauthorized entry.

B. Security of the job area shall be strictly maintained. The Prime Trade Contractor shall be responsible for keeping areas involved in the work locked and secure at all times when work is not in progress, and no Contractor representative is on site.

3.02 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site and existing facilities under construction. Allow entrance only to authorized persons with proper identification, and appropriate footwear, and hard hats, as determined by the Contractor Project Safety Inspector, and/or District Inspector.

B. Prime Trade Contractor shall control entrance of own persons and vehicles related to construction operations in accordance with the conditions during work, and not allow intrusion by others.

3.03 BADGES AND ESCORT REQUIREMENTS

A. All personnel shall wear badges distinguishing personnel requiring an escort (YELLOW badges) to areas of the campus outside of the work area from those not requiring an escort (GREEN badges).

B. Personnel without fingerprint and acceptable background check on file with the District shall require an escort to any area outside of the work area.

C. The Contract and Pre-Construction meeting wording lays out the appropriate procedures for Contractor and Subcontractor personnel in working on the school site.

END OF SECTION

SECTION 01 56 40

ENVIRONMENTAL MITIGATION

PART 1-GENERAL

1.01 SECTION INCLUDES

A. The Environmental Mitigation requirement for this project is recorded in this specification section 01 56 40. The measures mitigations may include, but are not limited to, procedures and standards to control:

1. Dust

2. Noise

3. Fumes

4. Timing of work activities

5. Erosion

6. Archaeological resources found during excavation

7. Preservation of trees

8. Demolition process and materials.

1.02 EXECUTION

A. The Contractor shall comply with the mitigation below in terms of what is to be controlled, acceptable methods, and standards (e.g. equipment must be muffled and noise levels may not exceed specified decibel levels).

B. The Contractor shall provide documentation of having met the mitigation requirements as described below to the Inspector and/or Project Manager within five (5) working days of the Notice to Proceed and at each phase of the project.

C. To reduce dust emissions and noise during construction by implementing the following:

1. Exposed surfaces should be watered twice daily.

2. Stockpiles of excavated materials should be covered.

3. Trucks carrying excavated materials from the site should be covered and should have their tires and undercarriages washed prior to exiting the site.

4. Streets affected by fugitive sand and dust are to be swept regularly by Prime Trade Contractors responsible for tracking of mud and/or sand to these streets.

5. Uncovered soil should be bound (by grass or similar groundcover) as soon as is reasonably possible.

6. Excavation should not be conducted when surface winds exceed 11 mph.

7. Unnecessary idling of construction vehicles and equipment should be avoided adjacent to areas of instruction, or adjacent to fresh air ductwork, or where noise will affect the areas of instruction.

8. Limit construction activities to a schedule that minimizes disruption as much as possible to area residences surrounding the project site property boundaries.

9. Schedule activities with the highest noise potential for the times when disruption of any instruction, or area of residences surrounding the project site will be at a minimum.

10. Require contractors to employ the lowest-decibel level equipment, or employ alternative equipment or to muffle/control noise from available equipment to the maximum extent possible.

11. Perform noisy operations (e.g., mixing concrete, hydraulic/mechanical demolition) off-site or on portions of the site furthest from noise sensitive receptors whenever possible, and in consult with the Inspector and/or Project Manager.

END OF SECTION

SECTION 01 57 23

STORM WATER POLLUTION PREVENTION

PART I - GENERAL

1.01 SECTION INCLUDES

A. Preparation, implementation and monitoring of Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the construction site into the receiving waters.

NOTE: CONSTRUCTION SHALL NOT START UNTIL CONTRACTOR HAS PREPARED AND OBTAINED APPROVAL OF SWPPP IN CONJUNCTION WITH DISTRICT PROJECT MANAGER'S REGISTRATION WITH STATE DEPARTMENT OF WATER RESOURCES.

B. Compliance with local, state and federal regulations.

C. Payment of application and annual fees required by the State Water Resources Control Board (SWRCB) within the duration of the construction contract.

D. Certification that the construction project has met all of the conditions of the General Construction Activity Storm Water Permit (GCASP).

1.02 REFERENCES

A. California Storm Water Best Management Practice Handbook for Construction Activity (BMP Handbook - MOST RECENT REVISION TO DATE).

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use materials of a class, grade and type needed to meet the performance described in the BMP Handbook.

PART 3 - EXECUTION

3.01 PREPARATION AND APPROVAL

A. Prepare the Storm Water Pollution Prevention Plan (SWPPP) as required to comply with storm water pollution regulations.

1. Use as a guide the BMP Handbook, MOST RECENT EDITIONS TO March 1993 edition, published by the Storm Water Quality Task Force.

B. Within two weeks after Award of Contract and Notice to Proceed by the District, submit to the Architect, 1 hard copy, and one electronic copy of the SWPPP for review and corrections. After the Architect's approval provide 3 ELECTRONIC copies of the corrected or modified SWPPP to the Architect.

C. On project sites that are 5 acres or more, submit to the District a completed Notice of Intent (NOI), and application fee payable to the State Water Resources Control Board with electroic copies of the approved SWPPP indicated in Paragraph B above.

3.02 IMPLEMENTATION

A. Install perimeter controls prior to starting other construction work at the site.

B. Contain on-site storm water at the jobsite. Do not drain on-site water directly into the storm drain.

C. Designate trained personnel for the proper implementation of the SWPPP.

D. Revise SWPPP to suit changing site conditions and also when properly installed systems are ineffective.

E. At the end of Construction Contract:

1. Leave in place storm water pollution prevention controls needed for post-construction storm water management and remove those that are not needed as determined by the District. Thereafter, left-in-place controls will be maintained by the District.

2. Provide Site Monitoring Reports, SWPPP revisions, Compliance Certifications and related documents to the District. Post-construction storm water operation and management plan as mentioned in the compliance certifications are considered to be in place at the end of the Construction Contract.

3.03 MONITORING

A. Conduct examination of storm water pollution prevention controls monthly, as well as before and after each storm. Prepare and maintain, at the jobsite, a log of each inspection using Site Monitoring Report forms.

3.04 LIABILITIES AND PENALTIES

A. Review of the SWPPP and inspection log by the District shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations.

B. Payment of penalties for non-compliance by the Contractor shall be the sole responsibility of the Contractor and will not be reimbursed by the District.

3.05 CHANGE OF INFORMATION

A. Submit to the District a completed NOI for change of information (Construction Site Information and Material Handling/Management Practices).

3.06 ATTACHMENTS

A. Site Monitoring Report.

B. Compliance Certification.

END OF SECTION

_____ LVUSD Project Number	**GENERAL CONSTRUCTION ACTIVITY STORM WATER PERMIT**	STATE OF CALIFORNIA STATE WATER BOARD WDID NO._____

COMPLIANCE

School Name: _____

Project Description: _____ Contract Number

ANNUAL CERTIFICATION

I certify under penalty of the law that the ongoing construction project has met the following conditions: All elements of the Storm Water Pollution Prevention Plan are in place; construction materials and equipment maintenance waste have been disposed of properly; and the site is in compliance with all local storm water management requirements including erosion/sediment control requirements and the appropriate use permits have been obtained.

Contractor: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

END OF CONTRACT CERTIFICATION

I certify under penalty of the law that the construction project has been completed and the following conditions have been met:: All elements of the Storm Water Pollution Prevention Plan have been completed; construction materials and equipment maintenance waste have been disposed of properly; the site is in compliance with all local storm water management requirements including erosion/sediment control requirements and the appropriate use permits have been obtained; and a post-construction storm water operation and management plan is in place.

Contractor: _____

_____ LVUSD Project Number	**STORM WATER POLLUTION PREVENTION SITE MONITORING REPORT**	STATE OF CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

School Name: _____ _____
Project Description: Contract Number

I. Type of Examination: (Use one form for each type of examination)

☐ Prior to Anticipated Storm Event ☐ After Actual Storm Event ☐ Monthly

Date Examined: _____

II. Check the response for each SWPPP question below:

	YES	NO
1. Do you have an approved Storm Water Pollution Prevention Plan (SWPPP) and a BMP Handbook on site?	☐	☐
2. Does your SWPPP incorporate an up-to-date erosion control plan?	☐	☐
3. Is the erosion control installed per plan?	☐	☐
4. If the job is at a stage where the erosion control plan can not be constructed, is the erosion control at the Maximum Extent Practicable for the stage you are in?	☐	☐
5. Did you observe the presence of any floating materials such as oil, grease, pieces of wood, paper, etc., odor, toxics, and/ or sediments?	☐	☐

6. If yes, what is it that you observed? _____

III.Check the status of the following items as observed.

SWPPP Items	Acceptable	Not Acceptable	Repairs Required	Date Repairs Completed
1. Desilters (Cleaned)	☐	☐	☐	
2. Water Quality Basin	☐	☐	☐	
3. Silt Fences	☐	☐	☐	
4. Strawbales/Checkdams/Sandbags	☐	☐	☐	
5. Berms and Dikes	☐	☐	☐	

6.	Sand/Gravel Inlet	☐	☐	☐	
7.	Slope Protection - Polymer and Mulch	☐	☐	☐	
8.	Vegetation/Revegetation	☐	☐	☐	
9.	Dust Control	☐	☐	☐	
10.	Surface Erosion	☐	☐	☐	
11.	Slope Instability	☐	☐	☐	
12.	Storage	☐	☐	☐	
13.	Disposal	☐	☐	☐	
14.	Spills	☐	☐	☐	
15.	Clean-up	☐	☐	☐	
16.		☐	☐	☐	
17.		☐	☐	☐	

IV.Describe any problems or required repairs checked above and the necessary actions needed:

Item	Description of Problem or Required Repair	Action Needed

Examination Performed by Contractor: _____ _____

By (Print Name, Title and Sign) Date

Verified by Construction Inspector: _____ _____

Print Name, Title and Sign Date

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SECTION 01 73 00

FIELD ENGINEERING

PART 1-GENERAL

1.01 REQUIREMENTS INCLUDED

A. Surveying and Field Engineering Services.

1.02 QUALITY CONTROL

A. Land Surveyor: Registered in the State of California and acceptable to the District's Architect, Inspector, and/or Project Manager.

1.03 LINES AND GRADES

A. The Contractor shall provide all construction survey work required for the accurate location of the work. Horizontal and vertical control for the work shall be from the project reference marks as shown on the Drawings. In all questions arising as to the proper location of the work, the District's A&E team's, and the Inspector's decision shall be final.

B. The Contractor shall verify final configuration of the project during demolition work. Minor adjustments of the work to accommodate existing field conditions shall be the responsibility of the Contractor.

C. Replace, at no increase in Contract Sum, control points which may be lost or destroyed; base requirements on original survey control.

PART 2- PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify locations of survey control points prior to starting work. Promptly notify District Architect and Inspector of any discrepancies discovered.

3.2 SURVEY REFERENCE POINTS

A. Protect survey control points prior to starting site work; preserve permanent reference points during construction. Make no changes without prior written notice to the Architect and Inspector.

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

reasons. Replace dislocated survey points based on original survey control.

3.3 SURVEY REQUIREMENTS

A. Establish a minimum of three (3) permanent bench marks on site, referenced to establish control points. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate and lay out by instrumentation and similar appropriate means:

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

2. Grid or axis for structures.

3. Building foundation, column locations, and ground floor elevations.

4. Controlling lines and levels required for mechanical and electrical work.

5. Verify layouts as Work proceeds to assure compliance with required lines, levels and tolerances.

C. Periodically certify layouts by same means, with same approvals by the Architect and Inspector.

3.4 RECORDS

A. Maintain a complete and accurate log of all control and survey Work as it progresses.

B. On completion of foundation walls and major site improvement, including underground utilities, prepare a certified survey showing all dimensions, locations, angles, and elevations of construction to the Architect and Inspector for review and approval of the final survey for the Project record.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements for cutting and patching.

1.02 RELATED SECTIONS

A. Section 01 31 00: Project Coordination

B. Section 01 31 50: Project Meetings

C. Section 01 33 00: Submittals

D. Section 01 32 00: Schedule and Reports

E. Section 01 43 00: Testing and Laboratory Services

F. Section 01 78 00: Warranties & Bonds

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SUBMITTALS

A. The word "cutting" as used in the Contract Documents includes, but is not limited to, cutting, drilling, chopping, and other similar operations and the word "patching" includes, but is not limited to, patching, rebuilding, reinforcing, repairing, refurbishing, restoring, replacing, or other similar operations.

B. Cutting and Patching Proposal: CONTRACTOR shall submit a proposal describing procedures well in advance of the time cutting and patching will be performed if the Contract Documents requires approval of these procedures before proceeding. The Contractor shall be responsible for locating existing utilities within the Limits of Work, whether shown or not, prior to any excavation. Contractor shall protect in place all utilities not identified to be removed, relocated or abandoned. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required. Denote how it will be performed and indicate why it cannot be avoided.

2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance or other significant visual elements.

3. List products to be used and firms or entities that will perform this Work.

4. Indicate dates when cutting and patching will be performed.

5. Utilities: List utilities that cutting and patching operations will disturb or affect. List utilities to be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.

7. Review by ARCHITECT/Engineer and DSA INSPECTOR prior to proceeding with cutting and patching does not waive ARCHITECT/Engineer right to later require complete removal and replacement of defective Work.

3.02 QUALITY ASSURANCE

A. Requirements for structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain approval from ARCHITECT/Engineer and DSA Inspector of the cutting and patching proposal before cutting and patching the following structural elements:

a. Foundation construction

b. Bearing and retaining walls

c. Structural concrete

d. Structural steel

e. Lintels

f. Timber and primary wood framing

g. Miscellaneous structural metals

h. Equipment supports

i. Piping, ductwork, vessels, and equipment

j. Structural systems of special construction in Division 13 Sections.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safely.

1. Obtain review of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

a. Primary operational systems and equipment

b. Air or smoke barriers

c. Water, moisture, or vapor barriers

d. Membranes and flashings

e. Fire protection systems

f. Noise and vibration control elements and systems

g. Control systems

h. Communication and/or data systems

i. Electrical wiring systems

j. Operating systems of special construction in Division 13 Sections

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the opinion of ARCHITECT/Engineer/District, or DSA Inspector reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually satisfactory manner.

1. If possible, retain the original installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original installer or fabricator, engage another recognized experienced and specialized firm.

a. Firestopping

b. Acoustical ceilings

c. Acoustical panels

d. Carpeting

e. HVAC enclosures, cabinets, or covers

f. Ceramic and quarry tile

g. Gypsum board

h. Masonry (exterior and interior where exposed)

i. Tack boards

j. Casework

k. Finish carpentry

3.03 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

3.04 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

1. Before proceeding, meet at the Project site with District Inspector, District Project Manager and District Maintenance Supervisors and all contractors involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding. ENSURE THAT ALL AVAILABLE AS-BUILT DRAWINGS ARE PULLED AND REVIEWED PRIOR TO ANY CUTTING.

3.05 PREPARATION

A. Temporary support: Provide adequate temporary support of existing improvements or Work to be cut, with prior approval by the Structural Engineer and/or DSA Inspector.

B. Protection: Protect existing improvements and Work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of existing improvements or Work that might be exposed during cutting and patching operations.

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

D. Where the Work requires sandblasting of existing surfaces in order to receive new materials secured by cementitious, adhesive or chemical bond, completely remove

existing finishes, stains, oil, grease, bitumen, mastic and adhesives or other substances deleterious to the new bonding and/or fastening of new Work. Utilize wet sand blasting for interior surfaces and for exterior surfaces where necessary to prevent objectionable production of dust.

3.06 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay. Carefully remove existing Work to be salvaged and/or reinstalled. Protect and store for reuse into the Work. Verify compatibility and suitability of existing substrates before starting the Work.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or a diamond-core drill. Saw cut reinforcing bars and paint ends with bituminous paint except where bonded into new concrete or masonry.

4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating, backfill, and/or recompaction.

5. Woodwork: Cut and or remove to a panel or joint line.

6. Sheet Metal: Remove back to joint, lap, or connection. Secure loose or unfastened ends or edges and seal watertight.

7. Glass: Remove cracked, broken, or damaged glass and clean rebates and stops of setting materials.

8. Plaster: Cut back to sound plaster on straight lines, and back bevel edges of remaining plaster. Trim existing lath and prepare for new lath.

9. Gypsum Wallboard: Cut back on straight lines to undamaged surfaces with at least two opposite cut edges centered on supports.

10. Acoustical ceilings: Remove hanger wires and related appurtenances where ceilings are not scheduled to be installed.

11. Tile: Cut back to sound tile and backing on joint lines.

12. Flooring: Completely remove flooring and clean backing of prior adhesive. Carefully remove wood flooring for patching and repairing of existing wood flooring scheduled to remain.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with required tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation. Verify conditions of existing substrates prior to executing Work.

2. Restore exposed finishes of patched areas and extend finish restoration into retaining adjoining construction in a manner that will eliminate all evidence of patching and refinishing.

3. Concrete: Maintain cut edges in a moist condition for twenty four (24) hours prior to the placement of new concrete. In lieu of this an epoxy adhesive may be provided. Finish placed concrete to match existing unless noted otherwise. Concrete shall have a minimum compressive strength of 3,000 psi where installed to repair and/or match existing improvements, unless noted otherwise, and approved by the Structural Engineer, in conjunction with review by the DSA Inspector.

4. Metal Fabrications: Items to remain exposed shall have their edges cut and ground smooth and rounded.

5. Sheet Metal: Replace removed or damaged sheet metal items as required for new Work.

6. Glass: Install matching glass and re-seal exterior window assemblies.

7. Lath and Plaster: Install new lath materials to match existing and fasten to supports at 6"centers. Provide a 6" lap where new lath to adjoins existing lath. Fasten new lath as required for new Work. Restore paper backings as required. Apply a bonding agent on cut edges of existing plaster. Apply three coat plaster of the type, thickness, finish, texture, and color to match existing.

8. Gypsum Wallboard: Fasten cut edges of wallboard. Install patches with at least two opposite edges centered on supports and secure at 6" centers. Tape and finish joints and fastener heads. Patching shall be non-apparent when painted or finished.

9. Acoustical Ceilings: Comply with the requirements for new Work specified in related sections of the Contract Documents.

10. Resilient Flooring: Completely remove flooring and prepare substrate for new material.

11. Painting: Prepare areas to be patched, patch and paint as specified under related sections of the Contract Documents.

3.06 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged coverings to their original condition.

END OF SECTION

SECTION 01 74 13

CLEANING

PART 1 - GENERAL

1.01 SECTION INCLUDES.

A. Maintain premises and adjacent public and private properties free from accumulations of waste, debris, and rubbish, caused by operations during the project.

B. At completion of Work, remove waste materials rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave project clean and ready for occupancy.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Use only cleaning materials recommended by the manufacturer of surface to be cleaned.

B. Use cleaning materials only on proper surfaces recommended by the manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION:

A. Execute daily cleaning plans from each trade to ensure that buildings, grounds, and public and private properties are maintained free from accumulations of waste materials, rubbish and trash on a daily basis.

B. Wet down dry materials and rubbish to prevent blowing dust and debris on and from the construction work.

C. Daily, during progress of work, clean construction site and utilized public properties, and dispose of waste materials, debris and rubbish.

D. Provide on-site steel dump containers and appropriately sized trash containers for collection of waste materials, debris and rubbish.

E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off the District's property.

F. Vacuum clean and wet wipe interior building walls, floors, doors, windows, and hardware in preparation for and when ready to receive finish preparation and

painting. Continue vacuum cleaning on an as-needed basis until building is ready final inspection by the Architect, Inspector, and Project Manager and determined to be ready for substantial completion and occupancy.

G. Handle materials in a controlled manner to minimize any unnecessary waste or debris emanating from the construction areas. Do not drop or throw materials from heights: rather, a closed chute shall be used, to minimize unnecessary dust, waste or debris from the construction area.

H. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not migrate into new equipment or furniture, or onto wet, newly painted surfaces.

3.02 FINAL CLEANING:

A. Employ experienced workmen, or professional cleaners, for final cleaning.

B. Exterior: Clean surfaces of the construction and site including, but not limited to, fixtures, walls, soffits, floors, hardware, roofs, window and opening ledges and sills, horizontal projections, steps and platforms, walkways, rails and all like surfaces, and adjoining private and public property to the extent soiled by the Contractor's operations.

C. Interior: Leave all horizontal and vertical surfaces in vacuum cleaned, wet-wiped condition with all dust, dirt, stains, hand marks, paint spots, droppings, and other blemishes and defects completely removed, and conform to the following requirements:

1. Hard Floors: Freshly administer specified product sealants, and Wet mop/wash and dry, concrete, portland cement flooring, tile, elastomeric, epoxy, refinished and colored concrete, and similar hard floor surfaces free of dust, streaks or stains.

2. Resilient Tile Flooring: Freshly wax and buff as specified in Section 09 65 19.

3. Resilient Bases: Clean off adhesive smears and wipe clean with wet-wipe methods.

4. Unpainted and Painted Surfaces: Clean of dust, lint, streaks or stains, utilizing wet-wipe methods as necessary.

5. Tile Walls: Clean and polish per manufacturer's specifications.

6. Hardware and Metal Surfaces: Clean and polish all exposed surfaces using non-corrosive and nonabrasive materials.

7. Glass: Wash and polish both sides, and leave free of dirt, spots, streaks, and labels. Clean and polish mirrors.

8. Ceilings: Clean and free of stains, hand marks, and defacing.

9. Replace air conditioning filters as specified in Mechanical Specifications.

10. Clean ducts, blowers and coils, if air conditioning units were operated without filters during construction, and after final inspection.

11. Lighting fixtures: Replace lamps and clean fixtures and lenses if fixtures or lamps are dirty or have smudges or dust.

12. Fixtures and Equipment: Clean and polish mechanical and electrical fixtures and like items. Leave lighting fixtures free of dust, dirt, stains or waste material. Clean and service equipment and machinery, leaving ready for use.

13. Surfaces Not Mentioned: Clean according to the intent of this Section and as required for Architect's approval.

D. Contaminated Earth: Final clean up operation includes the removal and disposal of earth that is contaminated or unsuitable for support of plant life in planting areas, and filling the resulting excavations with suitable soil as directed and approved by the Architect, Inspector, and/or Project Manager.

Contaminated areas include those used for disposal of waste concrete, mortar, plaster, masonry, paints, and similar materials, and areas in which washing out of concrete and plaster mixers or washing of tools and like cleaning operations have been performed, and all areas and adjacent areas that have been oiled, paved, or chemically treated.

Do not dispose of waste, oil, solvents, paints, solutions, or like penetrating material by depositing or burying on School property; dispose of such material in a lawful manner.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparation and implementation, including reporting and documentation, of a Waste Management Plan for reusing, recycling, salvage or disposal of non-hazardous waste materials generated during demolition and/or new construction (Construction & Demolition (C&D) Waste), to foster material recovery and re-use and to minimize disposal in land fills.

B. Related Sections

1. Section 01 33 01: Submittals.
2. Section 01 50 00: Construction Facilities and Temporary Controls.
3. Section 01 77 00: Project Closeout.

1.2 REFERENCES

A. California Integrated Waste Management Act of 1989 (AB 939).

B. California Code of Regulations Title 14, Section 18700 et seq.

C. Collaborative for High-Performance Schools (CHPS).

1.3 SYSTEM DESCRIPTION

A. Collection and separation of all C&D waste materials generated on-site, reuse or recycling on-site, transportation to approved recyclers or reuse organizations, or transportation to legally designated landfills, for the purpose of recycling salvaging and/or reusing a minimum of 90% of the C&D waste generated.

1.4 SUBMITTALS

A. C&D Waste Management Plan (Exhibit 1): Within 10 calendar days after the Notice to Proceed and prior to any waste removal, submit the following to the OAR for review and approval. Update quarterly. Include:

1. Materials to be recycled, reused, or salvaged, either onsite or offsite.

2. Identification of licensed waste haulers and processors of recyclable materials. Permit or license and location of Project waste-disposal operations.
3. Estimates of C&D waste quantity (in tons) by type of material. (If waste is measured by volume, give density for conversion to weight in tons.) Provide total tons of waste generated as well as tons of recycled waste and calculate the recycled percentage.
4. Procedures for recycling/ reuse program.
5. Site Plan for placement of waste containers.
6. Documentation of recycling, salvaging and reusing material costs, and specific plans for recycling corrugated cardboard, metals, concrete brick, asphalt, beverage containers, clean dimensional wood, plastic, glass, gypsum board and carpeting.

B. C&D Waste Management Monthly Progress Report (Exhibit 2): Summary of waste generated by Project, monthly with Application for Payment. Include:

1. Firms accepting the recovered or waste materials.
2. Type and location of accepting facilities (landfill, recovery facility, used materials yard, etc.). If materials are reused or recycled on the Project site, location should be designated as "on-site reuse / recycling".
3. Type of materials and net weight (tons) of each.
4. Value of the materials or disposal fee paid.
5. Attach weigh bills and other documentation confirming amount and disposal location of waste materials.

C. C&D Waste Management Final Compliance Report: Final update of Waste Management Plan to provide summary of total waste generated by project, as well as the total recycled waste (recycled rate (%) = (recycled waste in tons)/(recycled waste in tons + disposed waste in tons) x 100. Recycled waste must be verified with receipts. See also Part 3.2 Attachments herein.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 IMPLEMENTATION

A. Implement approved Waste Management Plan including collecting, segregating, storing, transporting and documenting each type of waste material generated, recycled or reused, or disposed in landfills.

B. Designate an on-site person to be responsible for instructing workers and overseeing the sorting and recording of waste/ recyclable materials.

C. Include waste management and recycling in worker orientation and as an agenda item for regular Project meetings.

D. Recyclable and waste bin areas shall be limited to areas approved on the Waste Management Plan. Keep recycling and waste bins neat and clearly marked to avoid contamination of materials.

3.2 ATTACHMENTS

A. Exhibit 1: Waste Management Plan

B. Exhibit 2: Waste Management Monthly Progress Report.

C. CHPS Submittals: Upon completion of the project, submit final Total Waste Management Report for the completed project subject to the Architect's acceptance. Once accepted, transfer the information onto the CHPS Waste Management Summary Report (available on the CHPS website) and re-submit to the Architect for final acceptance.

EXHIBIT 1

WASTE MANAGEMENT PLAN
CONSTRUCTION/ MAINTENANCE/ALTERATION & DEMOLITION PROJECTS

PROJECT NAME: «PROJECT TITLE» «CONTRACT TITLE»
PROJECT NO: «Project Number»
NAME OF COMPANY:
CONTACT PERSON:
TELEPHONE:
PROJECT SITE LOCATION:
PROJECT TYPE: ☐ NEW CONSTRUCTION ☐ DEMOLITION
☐ MAINTENANCE/ALTERATION PROJECTS
PROJECT SIZE (SQ. FT.):
DATE & ESTIMATED PERIOD

(1) Material Type	(2) Tons Estimated Recycle	(3) Tons Estimated Reuse	(4) Tons Estimated Salvage	(5) Tons Estimated Landfill	(6) Proposed Disposal or Recycling Facility (e.g., Onsite, Name of Facility)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					=

Signature	Title	Date

Column 1	"Material Types" – Enter type of materials targeted for recycling, reuse, and/or salvage, either on- or off-site, and include a category for waste materials requiring disposal.
Columns 2 thru 4	"Estimated Generation" - Enter estimated quantities (tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated and state number of salvageable items.
Column 5	"Estimated Landfill" - Enter quantities (tons) of materials to be disposed in landfill.
Column 4	"Disposal Location" - Enter end-destination of recycled, salvaged, and disposed materials.
General :	(1) Attach proposed Recycling & Waste Bin Location Plan. (2) Attach name and contact data for each recycling or disposal destination to be used.

EXHIBIT 2

WASTE MANAGEMENT PROGRESS REPORT
CONSTRUCTION/ MAINTENANCE/ALTERATION & DEMOLITION PROJECTS

PROJECT NAME: «PROJECT TITLE» «CONTRACT TITLE»
PROJECT NO: «Project Number»
NAME OF COMPANY:
CONTACT PERSON:
TELEPHONE:
PROJECT SITE LOCATION:
PROJECT TYPE: ☐ NEW CONSTRUCTION ☐ DEMOLITION
☐ MAINTENANCE/ALTERATION PROJECTS
PROJECT SIZE (SQ. FT.):
PERIOD to

(1) Material Type	(2) Tons Actual Recycle	(3) Tons Actual Reuse	(4) Tons Actual Salvage	(5) Tons Actual Landfill	(6) Disposal or Recycling Facility (e.g., Onsite, Name of Facility)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					=

Signature	Title	Date

Column 1	"Material Types" – Enter type of materials targeted for recycling, reuse, and/or salvage, either on- or off-site, and include a category for waste materials requiring disposal.
Columns 2 thru 4	"Estimated Generation" - Enter estimated quantities (tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated and state number of salvageable items.
Column 5	"Estimated Landfill" - Enter quantities (tons) of materials disposed.
Column 4	"Disposal Location" - Enter end-destination of recycled, salvaged, and disposed materials.
General :	(1) Attach proposed Recycling & Waste Bin Location Plan.
	(2) Attach name and contact data for each recycling or disposal destination to be used.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSE-OUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Procedures for closing-out Project.

1.02 RELATED SECTIONS:

A. Closeout Submittals: See Respective Specification Sections.

1.03 GENERAL:

A. As a prerequisite for final payment release, Contractor shall complete the work of this Section.

B. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.04 PRE-FINAL INSPECTION; SUBSTANTIAL COMPLETION:

A. Pre-final Inspection:

1. Upon "substantial completion" of the Work AS AGREED TO BY Contractor, Architect/Engineer, DSA Inspector of Record and District Project Manager, Contractor shall notify Architect/Engineer, and DSA Inspector and request a "pre-final inspection" of the Work.

2. If Architect/Engineer, Inspector, and Project Manger concur that work of the contract project/phase is "substantially complete", he will review and list any items that need to be corrected on a punch list. List will be amended as required to include items on the correction or punch list subsequently observed.

B. Substantial Completion Defined: "Substantial Completion" of the Work is the status, as approved by the Architect/Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the District/Owner can occupy or utilize the Work for the use for which it is intended.

1.05 FINAL INSPECTION:

A. Reference: See Supplementary Conditions.

B. Final Inspection: When Contractor has complied with above Article at the end of the final phase, Architect/Engineer and DSA Inspector and Project Manager will review the Work and list any items that are not completed or need to be corrected.

C. Contractor shall complete and/or correct the Work in a timely manner as outlined in the contract documents.

1.06 GUARANTEES:

A. General: Contractor shall guarantee in writing to District/Owner that:

"Contractor will repair or replace any or all of such work, together with any other adjacent work which may be displaced in connection with such replacement, that may prove to be defective in workmanship or material within a period of (stated below) years from the date of acceptance of the above mentioned structure by the Glendale Unified School District, ordinary wear and tear, and unusual abuse or neglect excepted."

B. Format: Contractor shall submit guarantees typed in the format indicated in "Guarantee Form".

C. Number of Copies: Submit in triplicate (3) to Architect/Engineer with one electronic pdf.

D. Required Guarantees:

1. General: Submit all guarantees listed herein or required by various Spec. Sections.

2. General Guarantee:

a. By General Contractor; For the Entire Work: 1 Year.

3. Specific Guarantees:

SPEC DIVISION	ITEM	TIME PERIOD
a.	Division 6 Custom Casework	2 Years
b.	Division 7 Built-up Roofing	10 Years
	All Flashing & Sheet Metal, in connection with roof coverings	5 Years
	All Joint Sealants	5 Years
	Damp proofing	2 Years
c.	Division 8 Hollow Metal Doors & Frames	2 Years
	Wood Doors	Lifetime

d. Division 9 Acoustical Ceiling Systems .....2 Years

e. Division 10.....Porcelain Enamel Liquid
Marker Board Surfaces .....Lifetime
Toilet Compartments .....Lifetime
Operable Walls.....3 Years
Toilet Accessories.....1 Years

f. Division 11.....Equipment
Projector Screen .....1 Years
Laboratory Equipment and Cabinets.....Lifetime

g. Division 12 Furnishings
Vertical Blinds .....Lifetime

h. Division 14.....Hydraulic Elevator 1 Year
Wheelchair Lift .....1 Year

I. Division 15.....Plumbing
1 Year
HVAC Systems.....1 Year
Temperature Controls
for HVAC Systems .....1 Year

j. Division 16.....All Electrical Work .....1 Year

1.07 WARRANTIES:

A. General: Comply with Section 01780. Submit all warranties required by various Specification Sections.

1.08 CERTIFICATES:

A. General: Submit in triplicate (3) all certificates required by various Specification Sections or listed herein, notarized as required.

B. Certificates:

1. Division 8: Finish Hardware installation acceptance.

2. Division 28: Fire Alarm System.

1.09 OPERATION AND MAINTENANCE DATA:

A. General: Submit all manuals required by various Specification Sections or listed herein; three (3) copies each, and one electronic pdf. Provide durable binders, no less than 8-1/2" x 11" in size and provide the following information:

1. Identification on, or readable through, the front cover stating general nature of the manual.

2. Neatly typewritten index at the front of the Manual, furnishing immediate information as to location in the Manual of all data or equipment included.

3. Complete instructions regarding operation and maintenance of all equipment included.

4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.

5. Copy of all Guarantees and Warranties issued.

6. Copy of the approved Shop Drawings with all data concerning changes made during construction.

B. Extraneous data: Where contents of Manuals include Manufacturers' catalog pages, clearly indicate the precise items included in this installation by clouding, or highlighting, and delete, all manufacturers' data with which this installation is not concerned.

1.10 RECORD DRAWINGS:

A. Procedures:

1. Promptly following contract award, General Contractor shall secure from the District one complete set of Drawings. Identify the set as "Record."

2. Timing of Entries: Make entries within 24 hours after receipt of information on any changes by Contractor or Sub Contractors.

3. Contractor shall be responsible for maintaining and recording the changes on the set, and by affixing any related RFI, COR, and/or ASI applicable to the changes.

4. Do not use the "Record" set for any purpose except entry of new data and for review by the Architect. Maintain separate job sets for subcontractors and workers daily use.

5. Maintain the "Record" set at the job site where designated by the Architect/Engineer, in conjunction with the DSA Inspector.

6. Use all means necessary to protect the "Record" set from deterioration, loss or damage until completion of the work.

7. Making entries on Drawings: Using an erasable colored pencil, other than blue or black, not ink or indelible pencil, and clearly describe the change by note and by graphic line as required. Date all entries. Call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes.

   a. Changes due to approved change orders may be indicated by referencing the change order number and scope of change in lieu of revising the Drawings.

   b. The location and depth below finish grade or above ceilings and attic spaces of utilities shall be fully dimensioned and indicated on Drawings. Dimensions shall be taken to building lines or permanent landmarks.

8. The architect's approval of the current status of the "Record" drawings will be a prerequisite to the Architect/Engineer's and DSA Inspector's approval of requests for progress payments and request for final payment release.

   a. Progress approvals: Prior to submitting each request for progress payments, secure the District DSA Inspector's approval of the status of the "Record" Drawings.

   b. Prior to submitting request for final payment and final inspection, General Contractor shall submit the "Record Drawing" set to the District DSA Inspector, with transmittal letter, in duplicate, for approval and further processing through the Architect/Engineers for their approval and acceptance, and delivery to the District.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 78 00

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 SUBMITTAL REQUIREMENTS:

A. Assemble Warranties, Bonds, and Service and Maintenance Contract, executed by each of the respective Manufacturers, Suppliers, and Subcontractors, and submit to the Architect/Engineer for review and approval before Final Payment will be approved and released.

B Number of original signed copies required: Three (3) each and one electronic pdf.

C. Table of Contents Neatly typed in orderly sequence.

D. Provide complete information for each item:

1. Product or work Item.

2. Firm, with name of principal, address and telephone number.

3. Beginning date of Warranty, Bond, or Service and Maintenance Contract.

4. Duration of Warranty, Bond of Service, and Maintenance Contract.

5. Provide the following information for District/Owner's Personnel:

a) Procedure in case of failure or malfunction.

b) Instances which affect Warranty or Bond validity.

6. Contractor, name of responsible principal, address, telephone number and email address.

1.02 SUBMITTAL FORM:

A. Punch sheets for standard 3-ring binder.

B. Size: 8-1/2 x 11 inches.

C. Fold larger sheets to fit into binder.

D. Cover: Identify each packet with typed or printed title 'WARRANTIES AND BONDS" 1st:

1. Title of Project.

2. Name of Contractor.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA-TRAINING OF OWNER'S PERSONNEL

PART 1 - GENERAL

1.01 SECTION INCLUDES.

A. Assembly and submission of operating and maintenance data and manuals.

B. Submission of preliminary draft of final data and manuals.

C. Instruction of Owner's personnel in operation, adjustment and maintenance of products, equipment and systems.

1.02 MANUALS:

A. General: Where manuals are required to be submitted covering items included in this Work prepare all such manuals in durable plastic 3-ring binders no less than 8-1/2 by 11 inches in size and with at least the following:

1. Identification on, or readable through, the front cover stating general nature of the manual;

2. Neatly typewritten index near the front of the manual, furnishing immediate information as to location in the manual of all data;

3. Copy of all guarantees and warrantees issued.

B. Maintenance and operation instructions:

1. Procure or prepare and include in manuals, operating and/or maintenance instruction for all equipment and/or materials that will require any adjustment, servicing, or attention for its proper operation or use.

2. These instructions shall set forth all of the information necessary for the District to operate and make full and efficient use and perform such maintenance and servicing, as would ordinarily be done by the District or maintenance personnel.

3. Write instructions in simple, non-technical language when possible, with sufficient diagrams and explanation where necessary to be readily understandable by average layman. Possible hazards shall be particularly pointed out with instruction cautioning against mistakes that might result in damage or danger to equipment, building, or personnel.

C. Extraneous data: Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete or

otherwise clearly indicate all manufacturer's data with which this installation is not concerned.

1.03 MANUAL CONTENT:

A. Neatly typewritten table of contents for each volume, arrange in systematic order.

B. List:

1. Contractor, name of responsible principal, address, telephone number, and email address of the company contact.

2. Each product including name, telephone number, and email address of:

a. Subcontractor or installer.

b. Recommended maintenance contractor.

c. Local source for replacement parts (within 50 mile radius of site).

3. Product name and other identifying symbols set forth in Contract Documents.

4. Product Data:

a. Include only those sheets which are pertinent to specific product.

b. Annotate each sheet to:

1) Clearly identify specific product or part installed.

2) Clearly identify data applicable to installation.

3) Delete references to inapplicable data.

5. Drawings:

a. Supplement product data with drawings where necessary to clearly illustrate:

1) Relations of component parts.

2) Control and flow diagrams.

b. Do not use "Project Record Documents" as maintenance drawings.

6. Written Test:

a. Provide where necessary to supplement Product Data and drawings.

b. Organize in consistent format under separate headings for different procedures.

c. Provide logical sequence of instruction for each procedure.

7. Warranties, Bonds, and Maintenance Contracts:

a. Provide copies of each of the following:

1) Proper procedures in event of failure.

2) Instances which might affect validity of warranties, bonds, or contracts.

1.04 MANUAL FOR ARCHITECTURAL MATERIALS AND FINISHES:

A. Include the following manufacturer's data:

1. Catalog number, size, composition.

2. Color and texture designations.

3. Required reordering information.

4. Recommend cleaning materials and methods.

5. Cautions against detrimental cleaning materials and methods.

6. Recommend cleaning and maintenance schedule.

B. Submit specified information for the following:

1. Finish Hardware: Section 08 71 00.

2. Resilient Tile Flooring: Section 09 65 19.

3. Visual Display Surfaces: Section 10 11 10.

4. Toilet Compartments: Section 10 21 13.

5. Fire Extinguishers: Section 10 44 00.

6. Window Blinds: Section 12 21 00.

1.05 MANUAL FOR ROOFING MATERIALS

A. Include the following manufacturer's data:

1. Instructions for inspection, maintenance and repair.

1.06 MANUAL FOR MECHANICAL EQUIPMENT AND SYSTEMS

A. Include the following manufacturer's data:

1. Function, normal operating characteristics, and limiting conditions.

2. Performance curves, engineering data, and tests.

3. Complete nomenclature and commercial number of replaceable parts.

B. Operating procedures including:

1. Start-up, break-in routine, and normal operating instructions.

2. Regulations, control, stopping, shut-down, and emergency instructions.

3. Summer and winder operating instructions.

4. Special operating instructions.

C. Maintenance procedures including:

1. Routing operations.

2. Trouble shooting guide

3. Disassembly, repair, and reassemble.

4. Alignment, adjusting, and checking.

5. Servicing and lubricating schedule, including recommended lubricants.

D. Manufacturer's printed operating and maintenance instructions.

E. Control system operation sequences.

F. Parts list, illustrations, assembly drawings, and diagrams necessary for maintenance including:

1. Life expectancy of parts subject to wear.

2. Items recommended to be stocked as spare parts.

G. As-installed control systems diagrams.

H. Color-code legend, if any.

I. Valve tag number chart, with location and function of each valve, in typewritten format, clearly indicating location on a room, area, or building diagram in sufficient size to readily identify the item.

J. Submit specified information for the following; Mechanical equipment specified in the Mechanical Equipment schedules and Specifications.

1.07 MANUAL FOR ELECTRICAL EQUIPMENT AND SYSTEMS

A. Include the following manufacturer's data:

1. Description of unit and component parts including:

a. Function, normal operating characteristics and limiting conditions.

b. Performance curve, engineering data and tests.

c. Complete nomenclature and commercial number of replaceable parts.

2. Panel board circuit directories indicating:

a. Electrical service.

b. Controls.

c. Communications, if any.

3. As-installed wiring color-code legend, if any.

4. Operating procedures including:

a. Routine and normal operating instructions.

b. Sequences required.

c. Special operating instructions.

5. Maintenance procedures, including:

a. Routine operations.

b. Trouble-shooting guide.

c. Disassembly, repair, and reassembly.

d. Adjustment and checking.

6. Manufacturer's printed operating and maintenance instructions.

7. Parts list, including current prices, and recommended spare parts to be maintained in storage.

B. Submit specified information for the following:

1. Electrical equipment specified in Mechanical and Electrical Equipment Schedules and Specifications.

1.08 ADDITIONAL DATA

A. Prepare and include the following:

1. Additional data when need becomes apparent during instruction of District's personnel.

2. Additional data specified in other Sections of Specifications to be included.

1.09 SUBMITTAL SCHEDULE

A. Preliminary Draft:

1. Submit two copies of the proposed format, approximately fifteen (15) days before substantial completion to the Architect and Inspector and/or Project Manager for review and comments.

2. Architect and Inspector will review, and return one copy with any comments.

B. Final Submittal:

1. Submit, in final form, one copy of complete data seven (7) days prior to final inspection. Copy will be returned with comments.

2. Submit four (4) copies in approved final form prior to final inspection and acceptance, and occupancy.

1.10 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to Substantial Completion, instruct District's personnel in necessary operation, adjustment, and maintenance of products, equipment and systems. District's personnel will consist of on-site School site personnel laypersons; Facility and Support Operations maintenance technicians; other District personnel.

Instruction sessions (minimum of two) will be at a time and date convenient and pre-approved by the District Project Manager.

B. Operating and Maintenance Manuals, as well as knowledgeable installer(s) shall conduct the instruction, which SHALL BE VIDEOTAPED by the contractor, to constitute basis of instruction.

C. Review manual contents with District's personnel in detail to explain all aspects of operations and maintenance, and conduct hands-on demonstrations where appropriate, and conduct a question and answer session before the end of the training session. Training sessions will be as long as necessary to satisfy the personnel in attendance.

D. A listing of all personnel receiving instructions, complete with a sign-in sheet indicating the printed name, and the signature of those attending, dates and times of instruction, and pertinent data regarding the training specific equipment or system, shall be delivered to the Architect/Engineer/Inspector and/or Project Manager upon completion of instruction session(s).

E. The District's designated Facility and Support Operations (FASO) Representative will be instructed as to the proper operations of all environmental equipment and fire and life safety, and security systems prior to Substantial Completion and Occupancy of a project phase or building, or building area. This instruction will be provided to the District's FASO and School Site personnel with the basic working knowledge of all equipment systems.

F. Contractor shall perform all testing, adjusting, etc., as outlined in the specifications and/or as recommended by the manufacturer.

G. **All HVAC equipment shall be operated a minimum of two (2) weeks or no less than 80 hours, with District specified MERV 7 or higher rating pleated filters, prior to Substantial Completion approval**.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION - NOT APPLICABLE

END OF SECTION

SECTION 01 91 00 – COMMISSIONING

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. Commissioning consists of systematically documenting that specified components and systems have been installed and started up properly and then functionally tested to verify and document proper operation through all sequences of operation and conditions. In addition, training of the Owner's Operations Personnel will be verified and final project O&M Documents will be reviewed for completeness.

B. Related Sections:

1. Section 01 10 00 – "Summary of Work" for Commissioning Scope of Work.
2. Section 01 25 01 – "RFI" for procedures in preparing and submitting RFI's.
3. Section 01 32 00 – "Schedule and Reports" for progress Schedule, Construction Checklists and Progress Meeting requirements.
4. Section 01 33 01 – "Submittal Procedures" for requirements in preparing submittals.
5. Section 23 05 93 – "Testing, Adjusting and Balancing for HVAC" for Functional Performance Testing requirements.
6. Section 01 78 23 – "Operations and Maintenance Data Training" for requirements in scheduling, performing, documenting and evaluating the Training Sessions.
7. Section 01 77 00 – " Project Closeout" for requirements in preparation and submitting O&M Manuals and Drawings.

1.3 SYSTEMS TO BE COMMISSIONED

A. Mechanical Systems:

1. Heating Water Distribution
2. Chilled Water Distribution
3. Ventilation Systems

B. Plumbing Systems:

1. Domestic Water System

C. Electrical Systems:

1. Emergency Power System

2. Lighting Control System

1.4 DEFINITIONS

A. Basis of Design Document:

1. A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

B. Commissioning Authority:

1. An entity identified by the Owner who plans, schedules, and coordinates the Commissioning Team to implement the Commissioning Process.

C. Commissioning Plan:

1. Prepared and updated by the Commissioning Authority, the Commissioning Plan outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.

D. Commissioning Process:

1. A quality-focused process for enhancing the delivery of a project. The Process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

2. Commissioning is typically abbreviated by "Cx". Commissioning and Cx have the exact same meaning and will be used interchangeably throughout the Contract documents.

E. Commissioning Team:

1. The individuals who through coordinated actions are responsible for implementing the Commissioning Process.

F. Construction Checklist:

1. Documents prepared by the Cx Authority and issued to the Contractor early in the Construction Phase. The purpose of the Checklist is to verify that appropriate components are on site, correctly installed and functional & ready for Performance Testing.

G. Corrective Issue Report:

1. A report generated by the Cx Authority during Verification Testing documenting deficiencies found during the testing procedures.

H. Functional Performance Testing:

1. The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

I. Owner's Project Requirements:

1. A written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

1.5 COMMISSIONING TEAM

A. The Commissioning Team shall consist of a minimum of one (1) Representative for each of the following:

1. Owner.
2. Construction Manager.
3. Architect.
4. Engineer.
5. Contractor.
6. Commissioning Authority.

B. Each Commissioning Team Representative shall have at least five (5) years experience in construction administration along with a thorough understanding of construction project documentation procedures.

C. Each Cx Team Representative shall be familiar with ASHRAE Guideline 0 – The Commissioning Process.

PART 2 – PRODUCTS

2.1 VERIFICATION TESTING EQUIPMENT AND INSTRUMENTS

A. Contractor shall provide all tools, instruments, laptop computers, PDA,s, software programs and services required to perform system Verification Testing procedures. This includes providing the connection to systems to be tested, operation of the test equipment & instrumentation and generating test results as required.

PART 3 – EXECUTION

3.1 PROJECT SCHEDULE

A. The Commissioning Authority will provide to the Contractor a Schedule in CPM format identifying the Cx Activities for the Project. The Contractor shall incorporate these Cx Activities into the Master Project Schedule. The Cx Authority will review and update Cx Activities along with the Contractor's Master Schedule Update. Refer to Section 01 32 00 for procedures. Refer to a sample Cx Schedule at the end of this Section.

3.2 SUBMITTALS / SHOP DRAWINGS

A. The Commissioning Authority will review Product Submittals and Shop Drawings within the same review period as the Architect. The Cx Authority will review the Submittals and Shop Drawings for Cx Process related information and issue review comments directly to the Architect. Refer to Section 01 33 00 for procedures.

3.3 COMMISSIONING PROGRESS MEETINGS

A. The Commissioning Authority will conduct periodic Cx Progress Meetings throughout the construction phase of the project. Commissioning Team Members are required to attend these meetings.

B. The purpose of conducting Cx Progress Meetings separate from the regular job progress meetings is to focus on the Commissioning Process activities status, schedule and issues. Reference sample Cx Progress Meeting Agenda at the end of this Section.

C. Commissioning Team Members shall attend all Cx Progress Meetings.

D. At a minimum, the following meetings will be held:

1. Commissioning Kick-off Meeting – 1 Meeting (shortly after Pre-construction Meeting).
2. Commissioning Progress Meeting – (enter number) Meetings.
3. Testing / Training Meeting – 2 Meetings.

E. The Cx Progress Meetings shall be held at the Contractors Field Office.

F. The Cx Authority will conduct these meetings, record meeting minutes and distribute the minutes to all attendees with copies to appropriate entities.

3.4 QUALITY ASSURANCE TESTING

A. Contractor Field Testing:

1. The Commissioning Authority will receive one (1) copy of ALL Test Reports from the Contractor and assemble for record into the Commissioning Systems Manual.

B. Independent Testing:

1. The Commissioning Authority will receive one (1) copy of ALL Independent Testing Reports from the Contractor and assemble for record into the Commissioning Systems Manual.

C. Witnessing of Testing by Cx Authority:

1. Commissioning Authority shall be notified in advance of any Field or Independent Testing being performed. Refer to Section 01 40 00.

3.5 SUBSTANTIATING SYSTEM READINESS

A. The Commissioning Authority will prepare and issue to the Contractor a Construction Checklist Form for each system or major piece of equipment to be Commissioned. Reference sample Construction Checklist at the end of this Section.

B. The Contractor shall complete the Construction Checklist Forms, provided by the Cx Authority, as follows:

1. Complete Section 01 "Equipment Delivery" of the Construction Checklist and forward to the Cx Authority within seven (7) calendar days after equipment delivery to the site.

2. Complete Section 02 "Equipment Installation" of the Construction Checklist and forward to the Cx Authority within seven (7) calendar days after the equipment installation is completed.

3. Complete Section 03 "Equipment Start-up" of the Construction Checklist and forward to the Cx Authority within seven (7) calendar days after the equipment has been successfully started.

4. Complete Section 04 "Notification for Testing" of the Construction Checklist and forward to the Cx Authority within seven (7) calendar days after the equipment if fully operational and ready for Functional Performance Testing.

C. The Commissioning Authority will monitor and track the completion of the Construction Checklist Forms.

3.6 OPERATION & MAINTENANCE DATA

A. The Commissioning Process has special requirements on compiling and submitting Operation and Maintenance Data. O&M Data are required to be submitted to the Cx Authority immediately after receipt of the approved submittal from the Architect.

B. The Cx Authority will compile this information into the Project "Systems Manual" which will be used during Training Sessions.

C. Note that O&M Data must be submitted and approved BEFORE any Owner Training sessions will be allowed.

3.7 FUNCTIONAL PERFORMANCE TESTING

A. The Commissioning Authority will develop the Functional Performance Test Procedures to be used on the systems being Commissioned. The Test Procedures will be submitted to the Contractor in advance of scheduled Performance Testing to give the Contractor and Subcontractor's time to review the Procedures and make comments or suggest revisions. Reference sample Functional Performance Test Procedure Form at the end of this Section.

B. The Commissioning Authority will oversee and document results of all Functional Performance Testing Procedures required for equipment and systems to be Commissioned.

C. The Contractor is required to provide all testing instruments and all skilled labor required to conduct the Functional Test Procedures. The Commissioning Authority will attend all Functional Test Procedures and record all results of the Testing on the Functional Test Procedure Form.

3.8 CORRECTIVE ISSUE REPORT

A. The Commissioning Authority will document deficiencies discovered during Functional Performance Testing of systems on a Corrective Issue Report. The Cx Authority will then forward this form to the Contractor for action in correcting the deficiency.

B. When the deficiency has been corrected, the Contractor shall note action taken and return the Corrective Issue Report to the Commissioning Authority. Reference sample Corrective Issue Report at the end of this Section.

C. Corrective Issue Reports must be completed as a pre-requisite for Substantial Completion.

3.9 OWNER TRAINING

A. All training sessions shall be coordinated through the Owner and the Cx Authority. The Cx Authority will provide a Training Form template in the Commissioning Plan for the Contractor to complete. The Training Forms shall be used to schedule, perform and document the required training sessions.

B. After each Training Session is completed, the Cx Authority will issue an Evaluation Form to each of the Attendees. This feedback information will be provided to the Owner and Architect for review. Reference sample Evaluation Form at the end of this Section.

C. Refer to Section 01 78 23 for Owner training requirements.

COMMISSIONING CHECKLIST

PROJECT NAME: Herbert Hoover High School

MECHANICAL SYSTEMS - Heating, Ventilating, and Air Conditioning (HVAC)

Main Items Included in Scope	Required	Options Selected
Vibration isolation	X	
Dampers	X	
Air distribution systems	X	
Exhaust air systems	X	
Trend logs	X	
Test and Balance verification	X	
Refrigeration equipment and controls	X	

BUILDING ENVELOPE

Main Items Included in Scope	Required	Options Selected
Roofing system – water-proofing, insulation, roof membrane, rain and ice shield, pitch, coping, flashing, curbs for mechanical equipment, downspouts, drains, scuppers		☐
Exterior skin – curtainwall, storefront, masonry, brick / stone veneers, precast panels, metal panels, stucco / EIFS, siding		☐
Walls – vapor barriers, insulation, mortar nets, weeps, joints, sealants, masonry ties		☐
Slab on grade – vapor barriers, water-proofing, drainage, foundation drains		☐
Doors and windows – sealants, mechanical operation, sills, flashing, end dams, hardware		☐
Water tests, mockups, wind loads, thermal infiltration		☐
Special design features – dome, cornice, canopy, skylight, etc.		☐

ELECTRICAL LIGHTING SYSTEMS

Main Items Included in Scope	Required	Options Selected
Lighting controls (scheduled activators and occupancy sensors)	X	-
Daylight dimming controls	X	-
Lighting - exterior		☐
Lighting - interior	X	-
Emergency lighting	X	-
NOTES:		

END OF SECTION

SECTION 01 91 01 – ACOUSTICAL COMMISSIONING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This specification outlines testing requirements for the acoustical measurements of the background noise level and reverberation time in furnished and unoccupied classrooms, to show that the project is in compliance with the HPI-CHPS Acoustical Prerequisite (based on the CHPS Best Practice Manual 2009).

1.2 ACOUSTICAL CRITERIA

A. CHPS Best Practice Manual 2009 EQ3.0: Minimum Acoustical Performance requires the following:

1. *EQ3.0.P1* Unoccupied classrooms must have a maximum background noise level of no more than 45 dBA L_{Aeq}.
2. *EQ3.0.P2* Classrooms less than 10,000 cubic feet must have a 0.6-second maximum (unoccupied) reverberation time and classrooms with volumes between 10,000 cubic feet and 20,000 cubic feet must have a 0.7-second maximum (unoccupied, furnished, and fitted-out) reverberation time. (ANSI Standard S12.60-2002).

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.1 TEST PROCEDURES

A. The tests shall be performed by an independent acoustical consultant who is a member of the National Council of Acoustical Consultants (NCAC).

B. **Background Noise Levels:** Measure the background noise levels in unoccupied classrooms as follows:

1. Measure in general accordance with ANSI S12.60-2002, Annex E3.
2. A-weighted background noise level (L_{Aeq}) with the HVAC systems in operation, based on the following:
   a. Short-term (15 seconds) measurements are acceptable where exterior intrusive noise is deemed "not significant*"
   b. Long-term (30 minutes) measurements are required where exterior intrusive noise is deemed "significant*"

* To evaluate the significance of intrusive exterior noise, a 30-minute Equivalent Sound Level ($L_{Aeq(30mins)}$, in general conformance with ANSI S12.60-2002, Annex E3) measurement shall be made in the classroom that is subjectively assessed to represent the worst case exposure to exterior noise, with the HVAC system not in operation. This $L_{Aeq(30mins)}$ measurement shall be repeated with the HVAC in operation. If the second "HVAC-on" sound level is more than 5 dB greater than the initial "HVAC-off" measurement, exterior noise intrusion shall be deemed "not significant".

3. Sampling: Where the exterior intrusive noise is deemed "significant", the measurements described above shall be made in at least one classroom on each floor in the worst case (noisiest) locations on the school site. Where the exterior intrusive noise is deemed "not significant", perform measurements described above in two (2) typical classrooms on each floor.

C. **Reverberation Time:** Measure the reverberation time in unoccupied classrooms as follows:

1. Measure in general accordance with ANSI S12.60-2002, Annex E4.
2. Compare the arithmetic average of the reverberation time in the 500, 1000, and 2000 Hz octave bands for each room against the CHPS Best Practice Manual 2009 EQ3.0 Acoustical Prerequisite.
3. Sampling: Perform reverberation time measurements in at least one classroom on each floor.

3.2 MEASUREMENT CONDITIONS

A. The classrooms used for the field tests shall be fully constructed and furnished as shown on the project drawings and the HVAC system shall be balanced.

B. All measurements shall be made in unoccupied classrooms, during the hours of expected normal school operation. Measurements should not be made on weekends or public holidays.

3.3 TEST REPORT

A. Provide a report summarizing findings from the measurements.

B. In the event that the tests do not meet the CHPS Best Practice Manual 2009 EQ3.0 Minimum Acoustical Requirements, the acoustical consultant performing the tests shall provide a professional opinion on the primary reason(s) for the failure, especially with respect to construction issues versus design issues.

C.

END OF SECTION

SECTION 02 41 13 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of site improvements and all other related contiguous improvements as required. Refer to Demolition Plans for locations.
2. Demolition, dismantling, cutting and alterations as indicated, specified, and required for completion of the Contract; for new construction, modernization and rehabilitation projects, as applicable. Includes items such as the following:
    1. Protecting existing work to remain.
    2. Salvageable items to be retained.
    3. Cleaning soiled materials that are to remain.
    4. Disconnecting and capping utilities.
    5. Removing debris and equipment.
    6. Removal of items indicated on drawings.

B. Demolition of Existing Building Foundations
1. Demolition and removal of all existing building foundations, footings, slabs, retaining walls, etc. shall be carried in a careful and orderly manner, and according to all applicable codes and regulations for demolition of structures, safety of adjacent structures, dust control and disposal of materials.
2. Sprinkle Work with water to minimize dust. Provide hoses and water connections for that purpose.

C. Demolition and Removal of Pavements
1. Markup all existing utilities on site.
2. Sawcut all Concrete Pavements, as indicated on Drawings.
3. Remove all indicated pavements, walkways, curb and gutter, concrete ditches, landscape areas, etc.
4. Protect all manhole and valve covers, lids, vaults and other site fixtures, marked to remain.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 31 for "Site Clearing" and "Earthwork" as applicable.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the District's property.

B. Asbestos-Containing Materials (ACMs) and other hazardous materials: As identified in the Report, remove asbestos-containing materials (ASMs) and other identified hazardous materials.

C. Remove and Salvage: Items indicated to be removed and salvaged remain the District's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to District's designated storage area.

D. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

E. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain the District's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

B. Historical items indicated remain the District's property. Carefully remove and salvage each item in a manner to prevent damage and deliver promptly to the District.

C. Historical items, archeological or paleontological findings, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, commemorative benches, antiques, and other items of interest or value to the District, which may be encountered during demolition, remain the District's property. If such items are encountered, all project operations shall cease in the area of discovery immediately. The District shall secure the services of an archeological consultant to assess the resources, and determine a course of action.

1. Cooperate with District's archaeological consultant or historical adviser. [Refer to the Initial Study/Mitigated Negative Declaration (MND) for related requirements.]

D. Human Remains: In the event that human remains are discovered, there shall be no disposition of such human remains, other than in accordance with the procedures and requirements set forth in the California Health and Safety Code and Public Resources

Code. All project operations shall cease in the area of discovery immediately. In conjunction with the District, the Code provisions require immediate notification of the County Coroner and the Native American Heritage Commission.

1. Cooperate with the County Coroner, the Native American Heritage Commission representative and other related officials. [Refer to the Initial Study/Mitigated Negative Declaration (MND) for related requirements.]

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, for information only, unless otherwise indicated.

B. Proposed dust-control measures.

C. Proposed noise-control measures.

D. Schedule of demolition activities indicating the following:

1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.

2. Dates for shutoff, capping, and continuation of utility services.

E. Inventory of items to be removed and salvaged.

F. Inventory of items to be removed by District.

G. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by demolition operations.

H. Record drawings at Project closeout according to Division 1 Section "Project Record Documents".

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

I. Landfill records for record purposes indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA & SCAQMD notification regulations before starting demolition. Observe applicable Best Practices and implementation of the Storm Water Pollution Prevention Plan (SWPPP). Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Pre-demolition Conference: Conduct conference at Project site to comply with pre-installation conference requirements of Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by District as far as practical. Bidders shall make themselves fully aware of the existing conditions within the site scope limits scheduled for demolition and items/areas to remain protected in supplement to the Bid Drawings and Documents.

B. If conditions are encountered that vary from those indicated on plan, notify the Inspector of Record for instructions prior to proceeding.

C. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
   1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
   2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from owner.

1.8 SCHEDULING

A. Arrange demolition schedule so as not to interfere with District's on-site operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Requirements for satisfactory soil materials are specified in Division 31 Section "Earthwork". Refer to the Geotechnical Investigation Report dated prepared by Converse Consultants, for site soil requirements

   1. Obtain approved borrow soil materials off-site when sufficient satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped. Test lines as required.

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

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. Survey existing conditions of the improvements such as light standards and trees to determine the best method(s) for removal so as not to cause potential damage to persons and property during the course of removal.

E. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

3.2 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by District and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to District and to governing authorities.

a. Provide not less than 72 hours' notice to District if shutdown of service is required during changeover.

B. District will arrange for disconnecting and sealing indicated utilities serving structures to be demolished before start of demolition work, when requested by Contractor.

C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving structures to be demolished.

1. Arrange to shut off indicated utilities with utility companies.

D. Utility Requirements: Refer to Division 21, 22, 23 and 33 Sections, as well as the Contract Drawings, for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from District and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.

D. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

E. Protect existing site improvements, appurtenances, and landscaping to remain.

1. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

3.4 CUTTING EXISTING CONCRETE

A. Cutting of existing concrete shall be done by experienced workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Take care not to damage concrete that is intended to remain.

B. Extent of cutting of concrete shall be as indicated on drawings and in accordance with standard plans for public works construction plan no. 132-1. Replace concrete that is removed in excess of amount indicated or required.

C. Prior to cutting or coring concrete, determine locations of hidden utilities and take necessary measures to protect them from damage.

D. If an existing pavement joint or cracked area is within two feet outside of a designated sawcut line shown on the Drawings, removal and resurfacing shall be to that joint, and/or shall include the crack or cracked area, unless otherwise approved by Architect.

3.5 EXPLOSIVES

A. Explosives: Use of explosives will not be permitted.

3.6 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not create hazardous or objectionable conditions, such as ice, flooding, and pollution, when using water.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

C. Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

3.7 DEMOLITION

A. Demolition: Demolish improvements completely and remove from the site. Use methods required to complete Work within limitations of governing regulations and as follows:

B. Below-Grade Construction: Demolish foundation walls and other below-grade construction, as follows:

1. Completely remove below-grade construction, including foundation walls and footings.

2. Break up and remove below-grade concrete slabs, unless indicated to remain.

C. Filling Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition of buildings and pavements with soil materials according to requirements specified in Division 31 Section "Earthwork."

D. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

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

END OF SECTION

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SECTION 02 41 19 – (SELECTIVE) STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of buildings and structures inclusive of their foundations.
2. Demolition and removal of site improvements attached and/or adjacent to a building or structure to be demolished.
3. Disconnecting, capping or sealing, and abandoning of site utilities associated with the building or structure.
4. Disconnecting, capping or sealing, and removing site utilities associated with the building or structure.

B. Related Sections include the following:

1. Division 01, for use of the premises and related requirements.

a. Provide location of asbestos specification from District.
b. Provide title and location of document.

1.3 DEFINITIONS

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

B. Remove and Salvage: Detach items from existing construction and deliver them to District.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

1.4 SUBMITTALS

A. Qualification Data: For demolition firm.

B. Proposed Environmental-Protection, Dust-Control, Noise-Control Measures and On-Site Safety Measures and Provisions: Submit statement or drawing that indicates the

measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

C. Schedule of Building Demolition Activities: Indicate the following:

1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of temporary protection and means of egress.
5. Coordination of District's continuing occupancy of adjacent buildings and partial use of premises.

D. Pre-demolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by building demolition operations. Submit before Work begins. See related section 01 32 33 Photographic Documentation.

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

F. Statement of Hazardous or Toxic Materials Abatement: Upon completion of the removal of hazardous materials, and prior to proceeding with the remaining demolition, the Contractor shall obtain a letter from a qualified, independent asbestos abatement and/or LBP consultant stating that no asbestos-containing materials (ACMs) or lead-based paint (LBP) are present in the structures

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to South Coast Air Quality Management District (SCAQMD) regulations, Rule 1415. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

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

C. Regulatory Requirements: Comply with governing South Coast Air Quality Management District (SCAQMD) notification regulations before beginning demolition. Comply with hauling and disposal regulations of SCAQMD.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Building Code: 2007 California Building Code.

F. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.6 PROJECT CONDITIONS

A. Buildings and portions of buildings to be demolished will be vacated and their use discontinued before start of Work.

B. District will occupy another building immediately adjacent to demolition area. Conduct building demolition so District's operations will not be disrupted.

1. Provide not less than 72 hours' notice to District of activities that will affect District's operations. Maintain access to existing walkways, exits, and other adjacent occupied or used facilities.

a. Do not close or obstruct walkways, exits, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. District assumes no responsibility for buildings and structures to be demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by District as far as practical.
2. Before building demolition, District will remove items intended to be salvaged that are not part of built-in construction.

D. Provide location for asbestos spec.

1. Hazardous material remediation is specified location.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

1.7 COORDINATION

A. Arrange demolition schedule so as not to interfere with District's on-site operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of building demolition required.

B. Review Project Record Documents of existing construction provided by District. District does not guarantee that existing conditions are the same as those indicated in Project Record Documents.

C. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Architect.

D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

E. Verify that hazardous materials have been removed before proceeding with building demolition operations.

3.2 PREPARATION

A. Refrigerant: Remove and store refrigerant according to Title 40, Code of Federal Regulations, Part 82 and regulations of South Coast Air Quality Management District (SCAQMD), Rule 1415.

B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.

1. District will arrange to shut off indicated utilities when requested by Contractor.
2. If utility services are required to be removed, relocated, or abandoned, before proceeding with building demolition provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

C. Temporary Shoring: Shoring, if so required, is the responsibility of the Contractor. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished, as so required.

1. Strengthen or add new supports when required during progress of demolition.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent public rights-of-way, walkways, landscaping, building entries, and other building facilities and existing site conditions during demolition operations.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Architect, items may be removed to a

suitable, protected storage location during demolition and cleaned and reinstalled in their original locations after demolition operations are complete.

C. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by District and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to District and to authorities having jurisdiction.

    a. Provide at least 72 hours' notice to District if shutdown of service is required during changeover.

D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 1.

1. Protect existing site improvements, appurtenances, and landscaping to remain.
2. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
4. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
5. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
6. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise from occupied portions of adjacent buildings.

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated existing buildings and structures and contiguous site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain adequate ventilation when using cutting torches.
3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Engineering Surveys: Perform surveys as the Work progresses to detect hazards that may result from building demolition activities.

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

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from District and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as flooding, and pollution.

D. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

E. Existing Utilities: Abandon and/or remove existing utilities and below-grade utility structures as defined in the Contract Drawings. Cut utilities flush with grade.

F. Site Clearing: Remove all surface improvements, landscaping, grass, trees, and similar improvements to a minimum depth of 6-inches. Re-grade site as recommended in Part 3.6 of this Section.

3.5 EXPLOSIVE DEMOLITION

A. Explosives: Use of explosives is not permitted.

3.6 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with imported fill materials and letter to the Preliminary Geotechnical Investigation Report.

B. Site Grading: Refer to Division 31 for related information and requirements. Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes, approximately six-inches below adjoining grades.

1. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
2. Provide a smooth transition between adjacent existing grades and new grades.
3. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

C. Erosion Control: Following grading, and in conjunction with the Storm Water Pollution Prevention Plan (SWPPP), provide perimeter of demolition area with continuous line of straw rolls. Straw rolls shall be "Straw Wattles" as manufactured by California Straw Works, (916) 453-1456, or equal.

1. Straw rolls shall be manufactured from rice straw and wrapped in tubular plastic netting. Rolls shall be approximately nine inches in diameter and twenty-five feet long.
2. Provide five-inch deep trench, ten-inches wide, for straw roll placement around demolition area.
3. For bid purposes, straw roll perimeter shall follow temporary fencing and be placed eighteen-inches from inside of fence.

    a. Stake straw rolls with 18 or 24 inch wood stakes at four foot on center.
    b. Abut ends of straw rolls snugly against each other.

3.7 REPAIRS

A. General: Promptly repair damage to adjacent construction caused by building demolition operations.

B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain District's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill. Comply with the provisions as outlined in Section 01 74 19.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Disposal: Transport demolished materials off District's property and legally disposes of them.

3.9 CLEANING

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

END OF SECTION

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SECTION 03 10 00

CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Formwork for cast-in-place concrete as indicated.
2. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection.
2. Section 03 20 00: Concrete Reinforcement.
3. Section 03 30 00: Cast-In-Place Concrete.

1.2 REFERENCES

A. American Concrete Institute (ACI) Publication:

1. ACI 318 – Building Code Requirements for Structural Concrete, Chapter 6, Formwork, Embedded Pipes, and Construction Joints.
2. ACI 347 – Guide to Formwork for Concrete.

B. American Plywood Association (APA):

1. Form No. V345 - Concrete Forming Design/Construction Guide.

C. National Institute of Standards and Technology (NIST):

1. NIST Voluntary Product Standard PS 1.

1.3 SUBMITTALS

A. Submit detailed structural calculations and drawings approved and signed by a California registered Civil Engineer where the height of the falsework or vertical shoring, as measured from the top of the sills to the soffit of the superstructure exceeds 14 feet, or where individual horizontal span lengths exceed 16 feet, or where provision for vehicular traffic through falsework or shoring occurs. For all other falsework and shoring submit layout signed by California registered Civil Engineer, manufacturer's authorized representative or a licensed contractor experienced in the usage and erection of falsework and vertical shoring. A copy of the plans and calculation shall be available at the jobsite at all times.

B. Shop Drawings: Submit Shop Drawings indicating locations of forms, construction and expansion joints, embedded items, and accessories. Review and approval will not include form strength and adequacy.

C. Product Data: Submit manufacturer's Product Data for form materials and accessories.

D. Record Document: Keep an accurate record of the dates of removal of forms, form shores and reshores, and furnish copies to the Architect.

1.4 REGULATORY REQUIREMENTS

A. California Building Code (CBC), Chapter 19A, and ACI 318-08.

B. California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 4, Construction Safety Orders, Article 6, Excavations, Sections 1713 and 1717.

1.5 DELIVERY, STORAGE AND HANDLING

A. Storage shall prevent damage and permit access to materials for inspection and identification.

B. Deliver materials for forms in timely manner to ensure uninterrupted progress.

1.6 QUALITY ASSURANCE

A. Construction of Forms shall comply with the following as a minimum requirement:
   1. ACI 347, "Recommended Practice for Concrete Formwork"
   2. CBC Section 1906A.
   3. Tolerances shall conform to those as specified in ACI 301, "Specifications for Structural Concrete for Buildings", as applicable, unless exceeded by requirements of DSA or otherwise indicated or specified.
   4. Plywood: Conform to tables for form design and strength in APA Form V 345.

B. Mock-ups: Provide mock-ups for all exposed finishes; 100 square feet minimum size. Locate as required by the Architect, for review and approval prior to installation.

PART 2 - PRODUCTS

2.1 GENERAL

A. Form materials may be reused during progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, capable of producing formwork of required quality, and are structurally sound.

B. Form Lumber: WCLIB Construction Grade or Better, WWPA No. 1 or Better.

C. Plywood: NIST Voluntary Product Standard PS 1, Group 1, Exterior Grade B-B Plyform or better, minimum 5-ply and 3/4 inch thick for exposed locations and at least 5/8 inch thick for unexposed locations, grade marked, not mill oiled. Furnished plywood with medium or high density overlay is permitted.

D. Coated Form Plywood: For exposed painted concrete, plastic overlaid plywood of grade specified above, factory coated with a form coating and release agent Nox-crete", or equal.

E. Tube Forms: Sonoco "Seamless Sonotubes," or equal, of the type leaving no marks in concrete, one-piece lengths for required heights.

F. Special Forms: For exposed integrally-colored concrete, plywood as above with high density overlay, plywood with integral structural hardboard facing or fibrous glass reinforced plastic facing, providing specified finish.

G. For Exposed Concrete Finish:

1. Plywood: New, waterproof, synthetic resin bonded, exterior type Douglas fir or Southern pine plywood manufactured especially for concrete formwork and conforming to NIST Voluntary Product Standard PS 1, Grade B-B grade, Class I.
2. Glass-Fiber-Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.
3. Steel: Minimum 16 gage sheet, well matched, tight fitting, stiffened to support weight of concrete, without deflection detrimental to tolerances and appearances of finished concrete surfaces.
4. Plywood: "Finland Form," or "Combi Form" distributed by North American Plywood Corporation. The material shall be furnished with hard smooth birch face veneers with phenolic resin thermally fused onto panel sides. Edges shall be factory sealed.

H. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, not leaving metal within 1-1/2 inch of concrete surface.

I. Form Coating: Non-staining clear coating free from oil, silicone, wax, not grain-raising, "Formshield" by A.C. Horn, Inc., "Release" by Edoco/Dayton Superior ,or "Cast-Off" by Sonneborn/BASF Building Systems. Where form liners are furnished, provide form coatings recommended by form liner manufacturer.

J. Form Liner: Rigid or resilient type by L.M. Scofield, Symons, or Greenstreak, types shown or directed, matching approved Sample.

K. Void Forms: Manufactured by SureVoid Products, Inc., or equal. Forms shall be "WallVoid" for temporary support of concrete walls and grade beams spanning

between supports, and "SlabVoid" for creating gaps between concrete slabs or steps and underlying soils. Void forms shall be fabricated of corrugated paper with moisture resistant exterior, and shall be capable of withstanding working load of 1,500 psf. Provide accessories as required.

PART 3 - EXECUTION

3.1 GENERAL

A. Forms shall be constructed so as to shape final concrete structure conforming to shape, lines and dimensions of members required by Drawings and Specifications, and shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape with no sagging, displacement, or bulging between studs. Forms and their supports shall be designed so that previously placed structures will not be damaged. Use clean, sound, approved form material, coated with specified materials only, not oil. Provide backing on all plywood joints. Forms shall be true to line within tolerances as permitted under section 1.6 above.

3.2 TOLERANCES

A. Permitted abrupt or gradual irregularities in formed surfaces as measured within a 5 feet length with a straightedge shall per ACI 347,Table 3.1:

Class of Surface			
A	B	C	D
1/8 inch	1/4 inch	1/2 inch	1 inch

1. Class A: Use for concrete surfaces prominently exposed to public view.
2. Class B: Use for coarse-textured concrete-formed surfaces intended to receive plaster, stucco or wainscoting.
3. Class C: Use as a general standard for permanently exposed surfaces where other finishes are not specified.
4. Class D: Use for surfaces where roughness is not objectionable and will be permanently concealed.

B. Finish Lines: Position formwork to maintain hardened concrete finish lines within following permissible deviations.

1. Variation from Plumb:
   a. In 10'-0" 1/4 inch
   b. In any story or 20'-0" 3/8 inch
   c. In 40'-0" or more 3/4 inch

2. Variation from Level or Grades Indicated:
   a. In 10'-0" 1/4 inch
   b. In any bay or 20'-0" maximum 3/8 inch
   c. In 40'-0" or more 3/4 inch
3. Cross-Sectional Dimensions:
   a. Minus 1/4 inch
   b. Plus 1/2 inch

C. Building Lines: Variation of linear building lines from established position in plan and related position of columns, walls and partitions:
   a. In any bay or 10'-0" maximum 1/2 inch
   b. In 40'-0" or more 1 inch

D. Slab Openings: Variations in size and location of sleeves and slab openings shall not exceed 1/4 inch.

3.3 ERECTION

A. Conform to ACI 301 and ACI 347 except as exceeded by the requirements of code, regulatory agencies, or herein.

B. Plywood shall be installed with horizontal joints level, vertical joints plumb and with joints tight. Back joints by studs or solid blocking, and fill where necessary for smoothness. Reused plywood shall be thoroughly cleaned, damaged edges or surfaces repaired and both sides and edges oiled with colorless form oil. Nail plywood along edges, and to intermediate supports, with common wire nails spaced as necessary to maintain alignment and prevent warping.

C. Construction: Provide openings, offsets, keys, reglets, anchorages, recesses, moldings, chamfers, blocking, screeds, drips, bulkheads, and all other required features. Make forms easily removable without hammering or prying against concrete. Space forms apart with metal spreaders. Construct forms to accurate alignment, location and grades, and provide against sagging, leakage of concrete mortar, or displacement occurring during and after placing of concrete. Coordinate installation of inserts and anchors in forms according to Shop Drawings and requirements for work of other sections.

D. Openings for Cleaning: Provide temporary openings at points in formwork to facilitate cleaning and inspection. At base of walls and wide piers, bottom form board on one face for entire length shall be omitted until form has been cleaned and inspected.

E. Chamfers: Provide 3/4 inch by 3/4 inch chamfer strips for all exposed concrete corners and edges unless otherwise indicated.

F. Reglets and Rebates: As specified in Section 03 30 00: Cast-In-Place Concrete. Form required reglets and rebates to receive frames, flashing, and other equipment.

G. Form Joints: Fill joints to produce smooth surfaces, intersections, and arises. Use polymer foam or equivalent fillers at joints and where forms abut or overlap existing concrete to prevent leakage of mortar.

H. Recesses, Drips, and Profiles: Provide smooth milled wood or pre-formed rubber or plastic shapes of types shown and required.

3.4 REMOVAL OF FORMS

A. Forms shall not be removed until concrete has sufficiently hydrated to maintain its integrity and not be damaged by form removal operations. Unless noted otherwise and/or permitted by the Architect, wall forms shall not be removed in less than 5 days, floor slabs in less than 7 days, and ramp, landing, steps and floor slabs shall not be removed in less than 7 days. Shoring shall not be removed until member has acquired sufficient strength to support its weight, load upon it, and added load of construction. In no case shall forms be removed sooner than specified in ACI 347, paragraph 3.6.2.3, or CBC Section 1906A.2.

B. Compressive strength of in-place concrete shall be determined by testing field-cured specimens representative of concrete location or members, as specified in Section 03300: Cast-In-Place Concrete.

C. Reshore structural members as specified per ACI 347R-94. Maintain a form and shoring removal record. Contractor shall submit shoring/reshoring plans and calculations stamped and signed by a licensed civil or structural engineer for review and approval. Reshoring loads to lower floors shall be consistent with the design loads specified on the construction documents and with the acquired strength of the lower floors based on the time they have been allowed to cure before being loaded.

D. Remove formwork progressively so unbalanced loads are not imposed on the structure.

E. Avoid damage concrete surfaces during form removal.

F. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.

G. Remove formwork in same sequence as concrete placement to achieve similar concrete surface coloration.

3.5 SURVEY AND ADJUSTMENT:

A. Check forms before and during placement of concrete, using an instrument, and make corrections as work proceeds.

3.6 EMBEDDED PIPING AND ROUGH HARDWARE:

A. Comply with CBC, Section 1906A.3. Where work of other sections require openings for passage of pipes, conduits, ducts, and other inserts in the concrete, obtain all dimensions and other information. All necessary pipe sleeves, anchors, or other required inserts shall be accurately installed as part of the work of other sections, according to following requirements.

B. Conduits or Pipes: No pipe/conduit runs shall be embedded in structural concrete.

C. Sleeves: Pipe sleeves may pass through slabs or walls if not exposed to rusting or other deterioration and are of uncoated or galvanized iron or steel. Provide sleeves of diameter large enough to pass any hub or coupling on pipe, including any insulation.

3.7 FIELD QUALITY CONTROL

A. Inspection: Obtain inspection and approval of forms before placing structural concrete.

3.8 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.9 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Reinforcing bars for cast-in-place concrete
2. Reinforcing mesh for cast-in-place concrete
3. Accessories, including but not limited to chairs and tie wires
4. Reinforcing bars for masonry
5. Reinforcing bars for site-cast pre-cast concrete
6. Miscellaneous concrete work, including but not limited to areaways, cast-in-place valve boxes, pits, splash blocks, equipment bases, and other items as shown or required to complete all work.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection.
2. Section 03 10 00: Concrete Formwork.
3. Section 03 30 00: Cast-In-Place Concrete.
4. Section 04 82 00: Concrete Unit Masonry.

1.2 SYSTEM DESCRIPTION

A. Regulatory Requirements: Fabrication and placement of reinforcing shall be in accordance with requirements of CBC, Chapter 19A and ACI 318-08.

1.3 REFERENCES:

A. Comply with the following as a minimum requirement:

B. American Society for Testing and Materials (ASTM):

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184 - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

4. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
5. ASTM A497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
6. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
7. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

C. American Concrete Institute (ACI) Publication:
   1. ACI 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   2. ACI 318 – Building Code Requirements for Structural Concrete, as modified by CBC Sections 1903A and 1908A.

D. American Welding Society (AWS):
   1. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

1.4 SUBMITTALS

A. Shop Drawings: Submit steel reinforcement Shop Drawings in accordance with ACI 315. Shop drawings should include complete layouts, sections, and details for congested conditions, typical bending diagrams and offsets, splice lengths and locations, proposed layout where vertical and horizontal bars intersect, and wherever welding is proposed, detailed to conform to AWS and CBC requirements. Include slab plans, size and lengths of reinforcing steel.

B. Contractor to prepare 3' x 3' sample mock-up on site for review and approval by Owner's Representative prior to installation. Sample will show all concrete finishes, joints and colors.

C. Certification: Submit copies of welding operator's certificate.

D. Chemical Analysis: Provide for bars to be welded, in accordance with CBC, 1903A.4.

E. Closeout Submittals: Record exact locations of reinforcing that vary from Shop Drawings.

1.5 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:
   1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
   2. American Welding Society (AWS).
   3. American Concrete Institute (ACI).

4. CBC, Chapter 19A, Concrete.

B. Source Quality Control: Refer to Division 01 Sections & CBC Sections 1916A.2 and 1903A.4 for general requirements and to the following paragraphs for specific procedures. Testing laboratory retained by the Owner shall select test Samples of bars, ties, and stirrups from the material at the Project Site or from the place of distribution, with each Sample consisting of not less than two 18 inch long pieces, and perform the following tests according to ASTM A615, or ASTM A706, as applicable:

1. Identified Bars: If Samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when Samples are selected.
2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random Samples are obtained, perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.
3. Testing to be per CBC Sections 1916A.2 and 1704A.4.2.

C. Certification of Welders: Shop and Project site welding shall be performed by welding operators certified by AWS.

1.6 DELIVERY, STORAGE AND HANDLING

A. Avoid exposure to dirt, moisture or conditions harmful to reinforcing.

B. Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape. Use metal tags indicating size, length and other marking shown on placement drawings. Maintain tags after bundles are broken.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide reinforcing of sizes, gages and lengths indicated, bent to indicated shapes.

2.2 MATERIALS

A. Steel Reinforcing Bars: ASTM A615, or ASTM A706 deformed grade 60 billet steel unless otherwise specified or indicated. Deformations to be per ASTM A-305.

B. Reinforcing Bars for welding: ASTM A706, Grade 60.

C. Welded Wire Fabric for Reinforcement: ASTM A185, 60 KSI minimum tensile strength.

D. Tie Wire: ASTM A82, fully annealed, copper-bearing steel wire, 16 gage minimum.

E. Chairs, Spacers, Supports, and Other Accessories: Standard manufacture conforming to CRSI and ACI 315 fabricated from steel wire of required types and sizes. For reinforcement supported from grade, provide properly sized dense precast blocks of concrete with embedded wire ties.

F. Welding electrodes: AWS D1.4, Table 5.1 and 5.3 low hydrogen electrodes, E9018 for Grade 60 steel.

2.3 FABRICATION OF REINFORCING BARS:

A. Comply with CRSI Manual of Standard Practice for Reinforced Concrete Construction for fabrication of reinforcing steel.

B. Bending and Forming: Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are not permitted. Provide only tested and permitted bar materials.

C. Welding: Provide only ASTM A706 steel where welding is indicated. Perform welding per CBC Section 1903A.4 by the direct electric arc process in accordance with AWS D1.4 and specified low-hydrogen electrodes. Preheat 6 inches each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is not permitted. Do not tack weld bars. Clean metal surfaces to be welded of loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds deemed defective, using chisel, and replace with proper welding. Prequalification of welds shall be in accordance with CBC requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as indicated on reviewed Shop Drawings. Before installation, and again before concrete is placed, clean reinforcing of loose scale, rust, oil, dirt and any coating that could reduce bond.

B. Securing in Place: Accurately place bars and wire tie in precise position where bars cross. Bend ends of wire ties away from the forms. Wire tie bars to corners of ties and stirrups. Support bars according to the current edition of "Recommended Practice for Placing Bar Supports" of Concrete Reinforcing Steel Institute, using approved accessories and chairs. Place precast concrete cubes with embedded wire ties to support reinforcing steel bars in concrete placed on grade and in footings. Use care not to damage vapor barriers where they occur. Accurately position, install, and secure reinforcing to prevent displacement during the placement of concrete.

C. Exposed Concrete Surfaces: Provide stainless steel or exterior quality vinyl plastic tipped chairs, bolsters, and accessories where exposed on exterior or interior concrete surfaces not to be painted or permanently covered. Provide metal chairs to hold reinforcement the required distance above form bottoms. In beams and slab construction, provide chairs under top slab reinforcement as well as under bottom reinforcement. Space chairs so that reinforcement will not be displaced during installation. Provide metal spacers to secure proper spacing. Stirrups shall be accurately and securely wired to bars at both top and bottom. At slabs, footings, and beams in contact with earth, provide concrete blocks to support reinforcement at required distance above grade.

D. Clearances: Maintain minimum clear distances between reinforcing bars and face of concrete as indicated on Structural Drawings.

E. Splices: Do not splice reinforcing bars at the points of maximum stress except where indicated. Lap splices as shown or required to develop the full strength or stress of bars. Stagger splices in horizontal wall bars at least 48" longitudinally in alternate bars and opposite faces.

F. Field Welding of Bars: As specified on plans for fabrication. All welding to be per CBC Section 1903A.4.

G. Maintaining Bars In Position: Take adequate precautions to assure that reinforcing position and spacing is maintained during placement of concrete.

H. Reinforcing Mesh: Lap one full mesh plus 2", or 9" whichever is greater, at splices, wire tie, and support the same as specified for bars.

I. Do not install reinforcing in supported slabs and beams until walls and columns have been installed to underside of slabs and beams or until construction joints have been thoroughly cleaned. Reinforcing shall be inspected before placement of concrete and cleaned as required.

J. Use deformed bars unless otherwise indicated.

3.2 FIELD QUALITY CONTROL:

A. Supervision: Perform Work to this Section under supervision of a capable superintendent.

B. Inspection: Obtain inspection per CBC Sections 1704A.4.2 & 1916A.2 and approval of reinforcing before concrete is placed.

C. Welding Inspection: Whether welding is done in the shop or at the site, perform welding of reinforcing bars under inspection of the Testing Laboratory Welding Inspector who is specially qualified and approved by DSA in accordance with CBC Section 1704A.4.2. The welding inspector shall make a systematic record of all welds.

1. This record shall include:
   a. Identification marks of welders.
   b. List of defective welds.
   c. Manner of correction of defects.
2. The welding inspector shall check the material, equipment details of construction, and procedures as well as the welds. The inspector shall also check the ability of the welder. The welder shall furnish the architect, structural engineer and the enforcement agency with a verified report that the welding which is required to be inspected is proper and has been done in conformity with the approved plans and specifications. The welding inspector shall use all means necessary to determine the quality of the weld. The inspector may use gamma ray, magnaflux, trepanning, sonics or any other aid to visual inspection, which the inspector may deem necessary to assure the adequacy of the welding.

3.3 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.4 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Cast-in-place normal weight and lightweight concrete, placement and finishing.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection

2. Section 03 10 00: Concrete Forms and Accessories.

3. Section 03 20 00: Concrete Reinforcement.

1.2 REFERENCES

A. Comply with the following American Concrete Institute (ACI) Publications as a minimum requirement:

1. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.

2. ACI 211 – Recommended Practice for Selecting Proportions of Concrete.

3. ACI 301 – Specifications for Structural Concrete.

4. ACI 302.1R – Guide for Concrete Floor and Slab Construction.

5. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

6. ACI 305.1 - Specification for Hot Weather Concreting.

7. ACI 306.1 – Standard Specification for Cold Weather Concreting.

8. ACI 308 – Recommended Practice for Curing Concrete

9. ACI 309 – Recommended Practice for Consolidation of Concrete

10. ACI 318 - Building Code Requirements for Structural Concrete, as modified by CBC Sections 1903A and 1908A.

B. Comply with the following American Society for Testing and Materials (ASTM) Standards as a minimum requirement:

1. ASTM C31 – Standard Specification for Making and Curing Concrete Test Specimens in the Field.

2. ASTM C33 - Standard Specification for Concrete Aggregates.

3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

5. ASTM C88 - Standard Test Method for Soundness of Aggregates by use of Sodium Sulphate or Magnesium Sulphate.

6. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

7. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

8. ASTM C150 - Standard Specification for Portland Cement.

9. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

10. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.

11. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

12. ASTM C227 – Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).

13. ASTM C231 – Air Content of Freshly Mixed Concrete by the Pressure Method.

14. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

15. ASTM C289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).

16. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

17. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.

18. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

19. ASTM C567 - Standard Test Method for Determining Density of Structural Lightweight Concrete.

20. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete. Fly ash shall not be used.

21. ASTM C845 - Standard Specification for Expansive Hydraulic Cement

22. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.

23. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

24. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

25. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures

26. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

27. ASTM D1751 - Standard Test Method for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

28. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

29. ASTM E1155 - Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

30. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

31. ASTM E1745 - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating locations of cast-in-place concrete work, dimensioned locations and types of construction and expansion joints, and accessory items such as vapor barriers. Include details and locations of reinforcing, embedded items, and interfacing with other Work.

B. Mix Design Data: Submit concrete mix designs as specified herein and in Article 2.2.

1. Submit name, address and telephone number of the concrete production facility which the contractor intends to engage to design the concrete mixes. Submit name and qualifications of the proposed concrete technologist.

2. Mix Design: Submit a concrete mix design for each strength and type of concrete indicated in the drawings or specified. Include water/cement ratio, source, size and amount of coarse aggregate and admixtures. Predict minimum compressive strength, maximum slump and air content percentage. Clearly indicate locations where each mix design will be used. Limit water content per cubic yard of mixed concrete to: 285 pounds maximum for normal weight concrete, 325 pounds maximum for light weight concrete.

3. Test Reports: Submit copies of test reports showing that the proposed mixes produce concrete with the strengths and properties specified. Include tests for cement, aggregates and admixtures. Provide gradation analysis.

C. Material Samples: Contractor to provide 3' x 3' mock-up samples for each type of concrete color, finish and jointing for Owner's approval prior to installation.

D. Certificates: Submit notarized certification that each of the following conforms to the standards indicated:

1. Portland cement: ASTM C150.

2. Normal weight concrete aggregates: ASTM C33.

3. Lightweight concrete aggregates: ASTM C330.

4. Aggregates: Submit evidence that the aggregate is not reactive in the presence of cement alkalis. In the absence of evidence, aggregate shall be tested per ASTM C289. If results of test are other than innocuous, aggregates shall be tested per ASTM C1567 as required by CBC, Section 1903A.3.

5. Curing materials: ASTM C171.

6. Manufacturer of ready-mixed concrete shall deliver to the IOR a certificate with each mixer truck. Certificate shall bear the signature of representative of the testing laboratory, and shall state quantity of cement, water, fine and coarse aggregate and admixtures.

E. Admixtures: Submit product data for proposed concrete admixtures.

1.4 QUALITY ASSURANCE

A. Concrete Manufacturer: Furnish concrete from licensed commercial ready-mix concrete plant conforming to DSA approved plans as well as ACI 318-05 as modified by CBC sections 1903A, 1904A, 1905A, and 1916A.

B. Continuous inspection shall be provided at the batch plant and for transit-mixed concrete to run check sieve analysis of aggregate, check moisture content of fine aggregate, check design of mix, check cement being used with test reports, check loading of mixer trucks, and certify to quantities of materials placed in each mixer truck.

C. Inspection shall be performed by a representative of a testing laboratory selected by the Owner. Owner will pay for inspection costs. Notify the laboratory 24 hours in advance of time concrete is to be mixed. Notify the laboratory of postponement or cancellation of mixing within at least 24 hours of scheduling time.

D. Contractor shall assist the testing laboratory in obtaining and handling samples at the project site and at the source of materials.

E. Continuous batch plant inspection requirement may be waived in accordance with CBC Section 1704A4.4. Waiver shall be in writing, including DSA approval. When batch plant inspection is waived by DSA, the following requirements shall be met:

1. Approved inspector of the testing laboratory shall check the first batching for each approved mix design and furnish mix proportions to the licensed weightmaster.

2. Licensed weightmaster shall positively identify materials as to quantity and certify to each load by a ticket.

3. Tickets shall be transmitted to the IOR by a truck driver with load identified thereon. The IOR will not accept the load without a load ticket identifying the mix and will keep a daily record of placements, identifying each truck, its load and time of receipt and approximate location of deposit in the structure and will transmit a copy of the daily record to DSA.

4. At the end of the project, the weightmaster shall furnish an affidavit to DSA certifying that all concrete furnished conforms in every particular to proportions established by mix designs.

F. Special Inspections and Tests shall be in accordance with CBC Chapter 17A, CBC Section 1916A and Specification Section 01420.

G. Allowable Tolerances: Construct concrete conforming to the tolerances specified in ACI 117 "Recommended Tolerances for Concrete Construction and Materials", as applicable, unless exceeded by requirements of regulatory agencies or otherwise indicated or specified.

H. Source Quality Control: Refer to the following paragraphs for specific procedures. Concrete materials which, by previous tests or actual service, have shown conformance may be used without testing when so approved by the Architect and DSA. Testing Laboratory shall perform following conformance testing.

1. Portland Cement: Furnish mill certificates in accordance with the CBC section 1916A.1 and acceptable to Architect and DSA, showing conformance with requirements specified.

2. Cementitious Material Test. The concrete supplier shall furnish to the enforcement agency certification from the cement manufacturer that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ASTM C 150 for Portland cement and ASTM C 595 or ASTM C 1157 for blended hydraulic cement, whichever is applicable. When a mineral admixture or ground granulated blast-furnace slag is proposed for use, the concrete supplier shall furnish to the enforcement agency certification from the manufacturer that they have been manufactured and tested in compliance with ASTM C 618 or ASTM C 989, whichever is applicable. The concrete producer shall provide copies of the cementitious material supplier's certificate of compliance that represents the materials used by date of shipment for concrete. Cementitious materials without certification of compliance shall not be used per section 1916A.1 of the 2007 CBC.

3. Aggregates for Normal Weight Concrete: Test the aggregate before and after concrete mix is designed and whenever character of aggregate varies or source of material is changed in accordance with ASTM C33 and CBC section 1903A.3. Include a sieve analysis. Obtain samples of aggregates at the dry batching or ready-mix concrete plant in accordance with ASTM D75 and perform tests for the properties listed in the following table.

4. Aggregates for Lightweight Concrete: Test the lightweight aggregates before mix is designed and whenever the character of aggregate varies or source is changed in accordance ASTM C330 and CBC section 1903A.3 Include sieve analyses, report on unit weights, report on deleterious substances, unburned or under-burned lumps, loss on ignition, soundness, staining materials, and crushed particles in coarse aggregate. Splitting tensile strength (FSP); 5.5 minimum.

PHYSICAL PROPERTIES		
Physical Properties, units	Test Method	Minimum values

Sieve analysis	ASTM C136	
Organic impurities	ASTM C40	Fine aggregate not darker than reference standard color
Soundness	ASTM C88	Loss after 5 cycles not more than 8 percent of coarse aggregate, nor more than 10 percent of fine aggregate
Abrasion	ASTM C131	Weight loss not more than 10.5 percent after 100 revolutions, 42 percent after 500 revolutions
Deleterious materials	ASTM C33	
Materials finer than No. 200 sieve	ASTM C117	Not over 1 percent for gravel, 1.5 percent for crushed aggregate
Reactivity potential	ASTM C227, C289, C342	Ratio of silica released to reduction in alkalinity not to exceed 1.0.
Sand equivalent	ASTM D2419	California sand equivalent values operating range not below 71 percent

I. Compliance with Regulations: All materials shall comply with the current rules and regulations of the local air quality management district, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous substances in construction products.

1.5 CONCRETE MIX DESIGNS

A. A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under the provisions of ACI 318 Section 5.2 as modified by CBC section 1905A.2. Mixes shall be based on existing approved compressive strength test data for concrete mixes in accordance with ACI 318 Section 5.3.1.1 and requirements below:

B. Strength Requirements: Design mixes for structural concrete for minimum 28-day compressive strengths required by Drawings and Specifications. The trial batch strength for each mix shall exceed indicated or specified strength by 750 psi or a lesser amount based on the standard deviations of strength test records according to ACI 318.

C. Normal Weight Concrete Mix Design: Design all mixes for workability and durability of concrete. Control the mixes in accordance with ACI 318 Section 5.2, ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, and Chapter 4, ACI 318, Building Code Requirements for Reinforced Concrete. Make adjustments in cement content required for concrete strengths at Contractor's expense and do not exceed 0.60 (or as indicated on concrete general notes of approved plans) absolute water-cement or cement plus fly ash ratio by weight. Do not use calcium chloride or any admix containing such material. Admixtures containing a material releasing nitrates in solution are limited to 0.06 percent by weight for the chloride ion.

D. Maximum Aggregate Sizes: Not exceeding 3/4 of minimum clear space between bars and between bars and forms, nor larger than 1/5 of least dimensions between the forms.

E. Design the mixes with 1" maximum size, except maximum 1-1/2" size for foundations and maximum 3/8" size at congested reinforcing or thin sections, as submitted by the contractor and approved by the Architect and Structural Engineer of Record.

F. Light Weight Structural Concrete: Design mixes in accordance with ACI 318 Section 5.2 and Section 5.3.1.1, and control mix in accordance with ACI 211.2, Standard Practices for Selecting Proportions for Structural Light Concrete. Design for air-dry density of 110 pounds per cubic foot maximum. With each mix design submit test reports showing concretes covered by the mix designs meet shrinkage test requirements specified under Article "Field Quality Control" hereinafter or include certified test reports showing conformance as furnished by the ready-mix concrete manufacturer.

G. ACI 318 Section 5.3.1.1 with test records. Where a testing laboratory acceptable to the enforcement agency has records of compressive strength tests, a standard deviation shall be established. Test records from which a standard deviation is calculated shall:

1. Represent materials, quality control procedures and conditions similar to those expected, and changes in materials and proportions within the test records shall not have been more restricted than those for proposed work.

2. Represent concrete produced to meet a specified strength or strengths f' c within 1,000 psi of that specified for proposed work.

3. Must consist of at least 30 consecutive tests or two groups of consecutive tests totaling at least 30 tests as defined in ACI 318 Section 5.6.2.4, except as provided in ACI 318 Section 5.3.1.2.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store cement and aggregate materials so as to prevent their deterioration or intrusion by foreign matter. Deteriorated or contaminated materials shall not be furnished.

B. Packaged materials shall bear the manufacturers and brand name label, and shall be stored in their original unbroken package in a weather tight place until ready for use in the work.

C. Ready-mix concrete shall be mixed and delivered in accordance with ASTM C 94. Each batch of concrete delivered to the Project site shall be accompanied by a time slip bearing departure time and signature of batch plant supervisor. Concrete shall be placed within 90 minutes after start of mixing. Deliver all materials in timely manner to ensure uninterrupted progress of the work.

1.6 PROJECT CONDITIONS

A. Cold Weather Requirements: Batching, mixing, delivering and placing of concrete in cold weather shall comply with the applicable requirements of ACI 306.1. When placing concrete during freezing or near-freezing weather the mix shall have a temperature of at least 50 degrees F, but not more than 90 degrees F when cement is added. Concrete shall be maintained at a temperature of at least 50 degrees F. for at least 72 hours after placing or until it has thoroughly hydrated. When necessary, concrete materials shall be heated before mixing. Special precautions shall be provided for protection of transit-mixed concrete. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. Surfaces, in which concrete is to come in contact with, shall be free from frost or ice. No frozen materials or materials containing ice shall be furnished.

B. Hot Weather Requirements: Batching, mixing, delivering and placing of concrete in hot weather shall comply with the applicable requirements of ACI 305R. During hot weather, proper attention shall be provided for ingredients, production methods, handling, placing, protection and curing, to prevent excessive concrete temperatures or water evaporation which could impair required strength or durability.

C. Concrete temperature of freshly mixed concrete shall be determined per ASTM C1064.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement: ASTM C150. Portland Cement.

B. Aggregates: Conform to the following standards:

1. Normal weight concrete: ASTM C33

2. Lightweight concrete: ASTM C330 sealed expanded shale such as "Rocklite", with fine aggregates per ASTM C33.

3. Aggregate shall be tested for Potential Alkali Reactivity of Cement-Aggregate Combinations per ASTM C289.

4. Nominal maximum size of coarse aggregate shall be no larger than:

a. 1/5 the narrowest dimension between sides of forms, nor

b. 1/3 the depth of slabs, nor

c. 3/4 the clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, or ducts.

d. Contractor may request the Architect and DSA waiver of the above limitations per CBC Section 1903A.3, provided that the workability and methods of consolidation are such that the concrete can be placed without honeycombs or voids.

5. Aggregates shall be from approved pits, free from vegetable matter and of opaline, feldspar, or siliceous magnesium substances; all washed, clean, hard, fine-grained sound crushed rock or gravel; not over 5 percent by weight of flat, thin, elongated, friable, or laminated pieces (pieces having major dimension over 5 times average dimension) or more than 2 percent by weight of shale or cherty material. Any suitable individual grading of coarse aggregate may be furnished, provided Grading of Combined Aggregate indicated in following table is obtained. Refer to Section 01420: Testing and Inspection.

GRADING OF COMBINED AGGREGATE

Sieve Number or Size in Inches	1-1/2" Maximum	1" Maximum	3/4" Maximum
Passing a 2"	------	------	------
Passing a 1-1/2"	95-100	------	------
Passing a 1"	70-90	90-100	------
Passing a 3/4"	50-80	70-95	90-100
Passing a 3/8"	40-60	45-70	55-75
Passing a No. 4	35-55	35-55	40-60
Passing a No. 8	25-40	27-45	30-46
Passing a No. 16	16-34	20-38	23-40
Passing a No. 30	12-25	12-27	13-28
Passing a No. 50	2-12	5-15	5-15
Passing a No. 100	0-3	0-5	0-5

C. Water: Water for concrete mixes, curing and cleaning shall be potable and free from deleterious matter.

D. Admixtures: Shall be shown capable of maintaining essentially the same composition and performance throughout the work as the product used in establishing concrete proportions in accordance with ACI 318, Section 3.6.

1. Admixtures containing chlorides or sulfides are not permitted.

2. Air-entraining admixtures shall comply with ASTM C260. Air-entrained admixtures shall not be used for floor slabs to receive steel trowel finish.

3. Admixtures for water reduction and setting time modification shall conform to ASTM C494.

4. Admixtures for producing flowing concrete shall conform to ASTM C1017.

5. Fly ash shall not be used.

a. Ground-granulated blast-furnace slag used as a partial substitution for ASTM C150 Portland cement shall meet the following requirements:

1) Shall conform to ASTM C989.

2) An approved per cent by weight of ground-granulated blast-furnace slag shall substitute for ASTM C150 Portland cement provided the mix design is proportioned per Section 1905A.3 and the durability requirements of Section 1904A are met.

6. Admixtures containing ASTM C845 expansive cements shall be compatible with the cement and produce no deleterious effects.

7. Silica fumes used as an admixture shall conform to ASTM C1240.

8. Chemical admixtures shall conform to ACI 318 Section 3.6.5, type A or D, manufactured by Grace or approved equal.

E. Reinforcement Fibers: Chop strands of alkali-resistant polypropylene or nylon fibers added to the concrete mix for protection against shrinkage cracks.

F. Expansion Joint Fillers: Preformed strips, non-extruding and resilient bituminous type, of thickness indicated, conforming to ASTM D1751 and ASTM D1752.

G. Curing Paper: Shall conform to ASTM C171 and consist of two sheets of kraft paper cemented together with a bituminous material in which are embedded cords or strands of fiber running in both directions. The paper shall be light in color, shall be free of visible defects, with uniform appearance.

H. Floor Hardener: Water soluble, inorganic, silicate-based curing, hardening, sealing and dustproofing compound. Aquaseal W20 by Monopole Inc., Kure-N-Harden by BASF, Chem Hard by L&M, Liqui-Hard by W. R. Meadows, or equal.

I. Underlayment: Two component latex underlayment for filling low spots in concrete for both interior and exterior applications, from featheredge to a maximum of 3/8 inch in thickness. Underlayment shall be non-shrink and suitable for repairing exposed concrete surfaces and for underlayment of carpet, resilient, tile and quarry floor coverings. La-O-Tex by TexRite, Underlay C or RS by Mer-Krete Systems, Underlayment 962 by C-Cure, or equal.

J. Vapor Barrier: Polyolefin-based 15 mils minimum thickness, meeting or exceeding ASTM E1745, 10 feet minimum width. Permeance shall be less than 0.01 perms [grains/(ft^2*hr*inHg)] as determined by ASTM E96 or ASTM F1249 and after mandatory conditioning tests per ASTM E154 Sections 8, 11, 12, & 13. Barrier shall have an impact strength greater than 70 grams per mil, and must be resistant to deterioration. Include accessories including tape and/or mastic. Stego

Wrap by Stego Industries LLC, Perminator by W.R. Meadows, Ecoshield-E by Epro, or equal.

K. Stair Strips and Nosing:

1. Fabricated from 6063-T5 extruded aluminum, mill finish. Anti-slip filler shall contain at least 60 percent virgin grain aluminum oxide abrasive. Binder shall be fully cured resilient type epoxy, with binder-to-filler ratio of 13 percent. The epoxy-abrasive filler shall extend over the curved front edge of the nosing and shall be securely bonded to the extruded aluminum base.

2. Manufactured by Wooster Products Inc. American Safety Tread Co. Inc., or equal.

3. Nosing and strips for concrete casting shall be provided with Sure-Hold anchors, chevron shaped continuous full length of nosing or strip.

4. Nosings and anchors for attachment to hydrated concrete stairs and wood stairs shall be similar to those specified below, except they shall be provided with countersunk holes for screws and fasteners.

5. Colors: As selected by Architect to contrast with stair color. Colors shall extend uniformly through the filler.

6. Strip and Nosing Types:

   a. Nosings for sloped riser steel pan stairs: Type WP4J, 4-1/16 inches wide, 3/8 inch thick.

   b. Nosings for new concrete stairs: Type WP4C, 4-1/16 inches wide, 3/8 inch thick, nose projects down 1/4 inch.

   c. Nosings for square edged steel pan stairs: Type WP4SP, 4-1/16 inches wide, 3/8 inch thick nose.

   d. Strips for recessing into concrete stairs: Type WP1A, except 2-1/4 inches wide, 3/8 inch thick. American Safety Tread Co., Type 24, or equal.

   e. Strips for adhering to existing or hydrated concrete: Flex-Tred anti-safety strips, minimum 2-1/4 inches wide. Cut from rolls and round corners.

   f. Strips for anchoring into wood or stone: American Safety Tread Co., Type T-24H, or equal, with holes for fasteners, 2-1/4 inches wide.

L. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

M. Construction Joint Materials: "Key-Kold" or "Kwik-Joint," of profiles indicated.

N. Bonding Agent: "Weld-Crete," manufactured by Larsen Products Co., P.O. Box 2127, Rockville, MD 20852, Master Builders "Concresive," or equal.

O. Epoxy Grout: Master Builders "Ceilcote 648," or equal.

P. Non-shrink grout:

1. For concealed areas: Master Builders "Embeco 885," or equal, non-gas-forming and free of oxidizing catalysts and inorganic accelerators, used as dry or damp pack, or mixed to a 20-second flow (CRC-C 611), without segregation or bleeding at any temperature between 45 degrees F and 100 degrees F. Working time 30 minutes or more.

2. For exposed areas: Master Builders "Masterflow 928," with same characteristics as specified for concealed areas.

Q. Drypack: Field mixture of I part Portland cement to 2 parts fine aggregate mixed to a damp consistency such that a ball molded in the hands will stick together and hold its shape. In lieu of field mixing, Contractor may use factory mixed drypack material, such as Master Builders "Set Grout."

2.2 CONCRETE MIX

A. Mix shall be signed and sealed by a Civil or Structural Engineer currently registered in the State of California.

B. Strength of Concrete: Strengths and types of concretes shall be as indicated in the Drawings. Unless otherwise indicated or specified, concrete shall be provided with minimum 28-day strength of 3000 psi (f'c).

C. The required strength and durability of concrete shall be determined by compliance with the proportioning, testing, mixing and placing provisions of CBC Sections 1905A.1 through 1905A.13. Concrete mix shall meet the durability requirements of ACI 318, Chapter 4.

D. Concrete proportioning shall be determined on the basis of field experience and/or trial mixtures shall in accordance with ACI 318, Section 5.3. Proportions of materials shall provide workability and consistency to permit concrete to be

placed readily into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding.

E. Ready-Mixed Concrete: Mix and deliver in accordance with requirements of ASTM C94. Furnish ready-mixed concrete from an approved commercial off-site plant. Use transit mixer trucks equipped with automatic devices for recording number of revolutions of drum, comply with CBC section 1905A.

F. Slump: Adjust quantity of water so concrete at point and time of placing does not exceed the slumps per plans when tested according to ASTM C143. Use the minimum water necessary for workability required by part of structure being cast.

PART 3 - EXECUTION

3.1 GENERAL

A. Surfaces to receive concrete shall be free of debris, standing water, and any other deleterious substances before start of concrete placing.

B. Time of Placing: Do not place concrete until reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, and other embedded materials are securely fastened in place. Contact the IOR at least 24 hours before placing concrete; do not place concrete until inspected by the IOR.

C. Pouring Record: A record shall be kept on the Project site of time and date of placing concrete in each portion of structure. Such record shall be maintained on the Project site until Substantial Completion and shall be available for examination by the Architect and DSA.

3.2 TOLERANCES

A. Concrete construction tolerances shall be as specified in ACI 117 and as modified herein.

B. Floor Flatness (F_F) and Floor Levelness (F_L) shall be as indicated below:

	Specified Overall Value		Minimum Local Value	
	F_F	F_L	F_F	F_L
Slabs on ground: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	15	10
Slab on ground: carpet.	25	20	17	15
Slab on ground: thinset tile and resilient flooring.	35	25	24	17

Suspended slabs: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	N/A	N/A
Suspended slabs: carpet.	25	20	N/A	N/A
Suspended slabs: thinset tile and resilient flooring.	35	20	N/A	N/A

C. Refer to ACI 302.1R, Tables 8.1 and 8.2 Slab on Ground and Suspended Flatness/Levelness Construction Guide, for recommended concrete placing and finishing methods.

D. Floor Flatness and Floor Levelness shall be tested in accordance to ASTM E1155. Floor measurements shall be made within 48 hours after slab installation, and shall precede removal of shores and forms.

3.3 PREPARATION

A. Vapor Barrier: Before installation of screeds and slab reinforcement, install vapor barrier under slabs on grade, as indicated in the drawings.

1. Install in accordance to ASTM E1643.

2. Place vapor retarder sheeting with the longest dimension parallel with the direction of the concrete pour.

3. Laps or seams shall be overlapped 12 inches, or as recommended by manufacturer. Laps and penetrations shall be sealed with the manufacturer's recommended tape and/or mastic.

4. Extend membrane and lap at least 4 inches onto adjoining wall surfaces and seal with pressure-sensitive tape.

5. IOR will inspect and mark areas of damage and insufficient installation of the vapor barrier sufficiently in advance of concrete placement.

a) Deficiencies shall be corrected before concrete is placed.

b) Patch damaged areas with vapor barrier overlapping all four sides 6 inches and adhering with tape.

B. Reglets and Rebates:

1. Form reglets and rebates in concrete to receive flashing, frames and other equipment as detailed and required. Coordinate dimensions and locations required with other related Work.

2. If concrete slabs on grade adjoin a wall or other perpendicular concrete surface, form a reglet in wall to receive and carry horizontal concrete Work. Reglet shall be full thickness of the slab and shall be 3/4 inch wide, unless

otherwise indicated. Requirement does not apply to exterior walks, unless specifically indicated.

C. Anchor Slots: Embedded anchor slots in concrete walls to receive masonry veneer shall be set vertically in forms, 24 inches maximum on centers measured horizontally. Anchor slots shall be No. 24 gage galvanized sheet steel with removable fiber filler to prevent seepage of cement in slot.

D. Screeds: Install screeds accurately and maintain at required grade or slab elevations after steel reinforcement has been installed, but before starting to place concrete. Install screeds adjacent to walls and in parallel rows not to exceed 8 feet on centers.

E. Screeds over Vapor Barrier: Use weighted pad or cradle type screeds and do not drive stakes through the vapor barrier. Check with an instrument level, transit, or laser.

F. Remove all free water from forms before concrete is deposited. Remove hardened concrete, debris, and foreign materials from interior surfaces of forms, exposed reinforcing, and from surfaces of mixing and conveying equipment.

G. Wetting: Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce adsorption and to help maintain concrete workability.

H. Earth Subgrade: Dampen 24 hours before placing concrete, but do not muddy. Re-roll where necessary for smoothness and remove loose material.

I. Gravel Fill: Recompact disturbed gravel and bring to correct elevation.

J. Sand Beds or Subslab Drainage Fill: Recompact disturbed material and bring to correct elevation.

K. Metal Floor Decking: Verify that decking joints are sealed and there are no openings or voids that will permit concrete leakage.

L. Composite Steel Beams: Provide shores for tributary construction loads to floor and roof beams as required, or camber the beams as approved by Architect. All concrete shall be thoroughly consolidated by suitable means during placement and shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.

3.4 INSTALLATION

A. Conveying and Placing:

1. Do not place concrete until reinforcing steel and forms or decks have been approved by the Inspector and other authorities having jurisdiction. Concrete shall be placed only under direct observation of the IOR. Do not place concrete outside of regular working hours, unless the IOR has been notified at least 48 hours in advance.

2. Concrete shall be conveyed from mixer to location of final placement by methods that will prevent separation or loss of materials. Place concrete in horizontal layers not more than 18" thick within 90 minutes after water is first added to the batch.

3. Concrete shall be placed as nearly as practicable to its final position to avoid segregation due to re-handling or flowing. No concrete that has partially hydrated or has been contaminated by foreign materials shall be placed, nor shall re-tempered concrete or concrete which has been remixed after initial set be placed.

4. In placing concrete in columns, walls or thin sections, provide openings in forms, elephant trunks, tremies or other recognized devices, to prevent segregation and accumulation of partially hydrated concrete on forms or metal reinforcement above level of concrete being placed. Such devices shall be installed so that concrete will be dropped vertically. Unconfined vertical drop of concrete from end of such devices to final placement surface shall not exceed 5 feet for concealed concrete or over 3 feet for exposed concrete.

5. Concrete shall be placed as a continuous operation until placing of panel or section is completed. Top surfaces of vertically formed lifts shall be level.

6. Concrete shall be thoroughly consolidated by suitable means during placement, and shall be thoroughly worked around reinforcement and embedded fixtures with mechanical vibrators and into corners of forms.

7. Where conditions make consolidation difficult, or where reinforcement is congested, batches of concrete adjusted to use smaller size aggregates than specified in the mix design shall be used as approved by the Architect and Structural Engineer.

8. Where new concrete is placed against or on old or existing concrete, apply bonding agent to surface of old concrete prior to placement of new concrete.

9. Comply with CBC Sections 1905A.9 and 1905A.10.

B. Cold Weather:

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. All ground with which concrete is to come in contact shall be free from frost. No frozen materials or materials containing ice shall be used.

2. The temperature of concrete at the time of placement shall not be below the minimum temperatures given in Table 3.1 of ACI 306.1.

3. Concrete shall be maintained at a temperature of at least 50° F. for not less than 72 hours after placing or until it has thoroughly hardened. Cover concrete and provide sufficient heat as required. When necessary, aggregates shall be heated before mixing. Special precautions shall be taken for protection of transit-mixed concrete.

C. Hot Weather:

1. Concrete to be placed during hot weather shall comply with the requirements of ACI 318, Section 5.13.

2. Maintain concrete temperatures indicated in Table 2.1.5 of ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square feet of exposed concrete per hour.

3. Cool concrete using methods indicated in ACI 305R Appendix B.

4. Place and cure concrete as specified in ACI 305R Chapter 4.

D. Compaction and Screeding:

1. Tamp freshly placed concrete with a heavy tamper until at least 3/8 inch of mortar is brought to surface. Concrete shall then be tamped with a light tamper and screeded with a heavy straightedge until depressions and irregularities are eliminated, and surface is true to finish grades or elevations. Remove excess water and debris.

2. Where slabs are to receive separate cement finish or mortar setting bed, continued tamping to raise mortar to surface is not performed. Laitance shall be removed by brushing with a stiff brush or by light sandblasting to expose clean top surface of coarse aggregate.

3. Compacting: Compact each layer of the concrete as placed with mechanical vibrators or equivalent equipment. Transmit vibration directly to concrete and in no case through the forms unless approved. Accomplish thorough compaction. Supplement by rodding or spading by hand adjacent to forms. Compact concrete into corners and angles of forms and around reinforcement and embedded fixtures. Recompact deep sections with congestion due to reinforcing steel as required.

4. Operation of Vibrators: Do not horizontally transport concrete in forms with vibrators nor allow vibrators to contact forms or reinforcing. Push vibrators vertically into the preceding layers that are still plastic and slowly withdraw, producing maximum obtainable density in concrete without creating voids or segregation. In no case disturb concrete that has partially set. Vibrate at intervals not exceeding two-thirds the effective visible vibration diameter of the submerged vibrator. Avoid excessive vibration that causes segregation.

E. Floating and Troweling:

1. When concrete has hydrated sufficiently, it shall be floated to a compact and smooth surface. After floating, wait until concrete has reached proper consistency before troweling. Top surfaces shall receive at least 2 troweling operations with steel hand trowel. Prior to and during final troweling, apply a fine mist of water frequently with an atomizing type fog sprayer. Omit troweling for slabs to receive a separate cement finish.

2. For interior finish slabs, final troweling shall provide a hard, impervious, and non-slip surfaces, free from defects and blemishes. Finished surface shall be within tolerances indicated in Article 3.02. Avoid burnishing. Do not add cement or sand to absorb excess moisture.

    a. Floor of Walk-In Refrigerator: Finish as specified above, to a smooth finish.

    b. Floor of Gymnasium Locker Rooms: After floating, and while the surface is still plastic, provide a fine textured finish by drawing a fine fiber bristle broom uniformly over the surface in one direction only. Floors sloped for drainage should be brushed in the direction of flow.

3. Exterior Paving and Cement Walks: Finish as specified above, except surface shall be given a non-slip broom finish to match Sample reviewed by the Architect.

4. Non-architectural vertical concrete surfaces shall be finished smooth and free from marks or other surface defects.

F. Curing:

1. Length of time, temperature and moisture conditions for curing concrete shall be in accordance with ACI 318, Section 5.11.

2. Forms containing concrete, top of concrete between forms, and exposed concrete surfaces after removal of forms shall be maintained in a thoroughly wet condition for at least 7 consecutive days after placing. Use the water curing method, curing sheet material, or a clear liquid membrane-forming curing compound except as otherwise specified.

3. If weather is hot or surface has dried out, spray surface of concrete slabs and paving with fine mist of water, starting not later than 2 hours after final troweling and continuing until sunset. Surface of finish shall be kept continuously wet until curing medium has been installed.

4. Immediately after finishing, monolithic floor slabs shall be covered with curing paper. Paper shall be lapped 4 inches at joints and sealed with waterproof sealer. Edges shall be cemented to finish. Repair or replace paper damaged during construction operations.

5. Within 24 hours after finishing, exterior slabs and paving, and interior slabs to receive cement topping or mortar setting beds, shall be covered with sand to a depth of 2 inches and kept thoroughly wet for 7 days. Instead of sand

covering, exterior walks and paving where no other surface treatment is specified, may be cured with clear liquid curing compound immediately installed in accordance with manufacturer's directions.

6. Test floors according to ASTM F2170 using RH probes for internal moisture of the concrete floor. Do not install floor finishes if moisture is too high, typically greater than 80%. Allow floors to dry adequately before floor covering installation; install floor covering with the indoor temperature abopve 60 degree F with maximum indoor relative humidity of 65%.

G. Filling, Leveling and Patching:

1. Concrete slabs exhibiting high or low spots and indicated to receive resilient floor covering or soft floor covering, shall have surfaces repaired. High spots shall be honed, or ground with power-driven machines to required tolerances. Low spots shall be filled with latex underlayment, installed in strict accordance with manufacturer's written recommendations.

2. Holes resulting from form ties or sleeve nuts shall be solidly packed, through exterior walls, by pressure grouting with cement grout, as specified. Grouted holes on exposed surfaces shall be screeded flush and finished to match adjoining surfaces.

H. Cement Base: Cement base shall be of the height, thickness, and shape detailed. Base shall be reinforced with one inch mesh, 18 gage, zinc-coated wire fabric. Base finish mixture shall be one part Portland cement, 2 parts of fine aggregate and one part pea gravel. Colored cement base shall include a chemically inert mineral oxide pigment in the mix.

I. Joints: Comply with CBC Section 1906A.4. Locate joints in concrete only where shown or approved and obtain prior approval for points of stoppage of any pour. Clean and roughen surface of construction joints by removing entire surface and exposing 1/4" of clean coarse aggregate solidly embedded in mortar matrix by sandblasting, chipping, use of an approved retarder agent, or equal. Water and keep hardened concrete wet for not less than 24 hours before placing the next lift or abutting concrete. Cover the horizontal surfaces of existing or previously placed and hardened concrete with a 2" thick layer of fresh concrete of required mix less 50 percent of coarse aggregate just before balance of concrete is placed.

J. Vertical Elements: Stop placement of concrete in walls and columns 1-1/2" below bottom of beams or supported slabs. Stop placement at sills and heads of wall openings in the same manner. Allow concrete in vertical elements to be in place at least 2 hours and until vertical settlement has ceased before placing concrete for floor framing.

K. Correction of Segregation: Before placing next layer of concrete, and at the top of each placement for vertical elements, remove all concrete containing excess water or fine aggregate, or showing deficiency of coarse aggregate, and fill the space with compacted concrete of correct proportions. Comply with CBC Section, 1906A.4.

3.5 FINISHING

A. Soda and Acid Wash: Concrete surfaces to receive plaster, paint or other finish, and which have been formed by oil coated forms, shall be scrubbed with a solution of 1-1/2 pounds of caustic soda to one gallon of water. Surfaces where smooth wood or waste molds have been furnished shall be scrubbed with a solution of 20 percent muriatic acid. Wash with clean water after scrubbing.

B. Sacking: Exposed concrete curbs, walls, and other surfaces shall be sacked by an application of Portland cement grout, floated, and rubbed. Sacking shall not be performed until patching and filling of holes has been completed. Entire sacking operation for any continuous area shall be started and completed within the same day.

1. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having consistency of thick paint. Wet surface of concrete sufficiently to prevent absorption of water from grout. Apply grout uniformly with a brush or spray gun, then immediately float surface with a cork or other suitable float, scouring wall vigorously.

2. While grout is still plastic, finish surface with a sponge-rubber float, removing excess grout. Allow surface to dry thoroughly, then rub vigorously with dry burlap to completely remove dried grout. No visible film or grout shall remain after rubbing with burlap.

C. Sandblasting: Exterior concrete surfaces to receive stucco dash coat finish, where plywood or other smooth forms have been furnished, shall be uniformly sand-blasted with sharp quartz sand under sufficient air pressure to remove dirt, form oil and other foreign materials, and roughen surface to provide a proper bond. Such surfaces shall be thoroughly washed with clean water after sandblasting.

D. Abrasive: Concrete stair treads, landings, ramps and steps on interior and exterior of buildings, and interior exposed concrete floors in shop buildings shall receive an abrasive finish.

E. Floor Hardener: Exposed interior concrete floors throughout shall be treated with floor hardener.

1. Protect adjacent surfaces. Clean surfaces to receive treatment in accordance with manufacturer's instructions, ensuring that all stains, oil, grease, form release agents, laitance, dust and dirt are removed prior to application.

2. Apply hardener in accordance with manufacturer's instructions as soon as concrete is firm enough to work on after final troweling.

F. Cement Grout and Dry-Pack Concrete: Cement grout shall be mixed at the Project site and shall be composed of one volume of Portland cement and 2-1/2 volumes of fine aggregate. Materials shall be mixed dry with sufficient water added to make mixture flow under its own weight. When grout is used as a dry pack concrete, add sufficient water to provide a stiff mixture, which can be molded into a sphere.

G. Broom Finish: Exterior stair treads and landings shall be provided with a non-slip broom finish in addition to abrasive finish specified.

H. Abrasive Stair Nosing: Nosing shall be installed according to manufacturers written recommendations.

3.6 GROUTING AND DRYPACKING

A. Install as indicated or required. Where grouting and drypacking is part of the work of other sections, it shall conform to the following requirements, as applicable.

B. Drypacking: Mix materials thoroughly with minimum amount of water. Install drypack by forcing and rodding to fill voids and provide complete bearing under plates. Finish exposed surfaces smooth and cure with damp burlap or liquid curing compound.

C. Non-Shrink Grouting:

1. Mixing: Mix the approved non-shrink grout material with sufficient water per manufacturers recommendations.

2. Application: Surfaces to receive the non-shrink grout shall be clean, and shall be moistened thoroughly immediately before placing the mortar. Before grouting, surfaces to be in contact shall be roughened and cleaned thoroughly, all loose particles shall be removed and the surface flushed thoroughly with neat cement grout immediately before the grouting mortar is placed. Place fluid grout from one side only and puddle, chain, or pump for complete filling of voids; do not remove the dams or forms until grout attains initial set. Finish exposed surfaces smooth, and cure as recommended by grout manufacturer.

3.7 EXPANSION AND CONSTRUCTION JOINTS

A. Construction Joints: Details and proposed location of construction joints shall be as indicated on the Drawings, located to least impair strength of structure, in accordance with the following:

1. Thoroughly clean contact surface by sand blasting entire surface not earlier than 5 days after initial placement.

2. A mix containing same proportion of sand and cement provided in concrete plus a maximum of 50 percent of coarse aggregate shall be placed to a depth of at least one inch on horizontal joints. Vertical joints shall be wetted and coated with a neat cement grout immediately before placing of new concrete.

3. Should contact surface become coated with earth, sawdust, or deleterious material of any kind after being cleaned, entire surface shall be re-cleaned before applying mix.

B. Expansion Joints: Provide expansion joints where indicated in walks and exterior slabs. Space approximately 20 feet apart (12 feet apart at traffic areas), unless otherwise indicated. Joints shall extend entirely through slab with joint filler in one piece for width of walk or slab. Joint filler shall be 3/8 inch thick, unless otherwise indicated.

C. Tooled Joints: Slabs, walks and paving shall be marked into areas as indicated with markings made with a V-grooving tool. Marks shall be round-edged, free from burrs or obstructions, with clean cut angles and shall be straight and true. Walks, if not indicated, shall be marked off into rectangles of not more than 12 square feet and shall have a center marking where more than 5 feet wide.

3.8 FIELD QUALITY CONTROL

A. Comply with pertinent provisions of section 01420.

B. Continuous Inspection: Construct structural concrete under continuous inspection of Project Inspector. Obtain approval of forms and reinforcing as required by the Inspector before placing structural concrete.

C. Molded Cylinder Tests:

1. IOR or testing lab personnel will prepare cylinders and perform slump tests. Samples for concrete strength shall be taken in accordance to ASTM C172. Each cylinder shall be dated, given a number, point in structure from which sample was obtained, mix design number, mix design strength and result of accompanying slump test noted.

2. Separate tests of molded concrete cylinders obtained at same place and time shall be made at age of 3 days, 7 days, and 28 days. A strength test shall be the average of the compressive strength of 2 cylinders, obtained from the same sample of concrete and tested at 28 days or at test age designated for determination of f'c. Retain one additional cylinder from each location to be tested in the event that the initial 2 cylinder test does not meet the project requirements.

3. Test cylinders shall be prepared at the Project site and stored in testing laboratory in accordance with ASTM C31, and tested in accordance with ASTM C39.

4. Frequency of testing shall conform to ACI 318 section 5.6.2 as a minimum requirement.

5. Control Test Cylinders: Cast a set of two or more cylinders for each day's placing of concrete for slabs supported on shoring. Place test cylinders on slabs represented by cylinders and cure the same as slabs. Test cylinders to determine proper times for removal of shores and reshoring. A strength test shall be the average of the compressive strengths of 2 cylinders made from the same sample of concrete and tested at 28 days.

D. Core Test: At request of the Architect, cores of hardened concrete shall be cut from portions of hydrated structures for testing, in accordance with CBC and ASTM C42.

1. Provide 4 inch diameter cores at representative places throughout the structure as designated by the Architect.

2. In general, provide sufficient cores to represent concrete placed with at least one core for each 4,000 square feet of building area, and at least 3 cores total for each Project.

3. Where cores have been removed, fill voids with drypack, and patch the finish to match the adjacent existing surfaces.

E. Concrete Consistency: Measure consistency according to ASTM C143. Test twice each day or partial day's run of the mixer.

F. Adjustment of Mix: If the strength of any grade of concrete for any portion of Work, as indicated by molded test cylinders, falls below minimum 28 days compressive strength specified or indicated, adjust mix design for remaining portion of construction so that resulting concrete meets minimum strength requirements.

G. Air Content Testing: Measure in accordance to ASTM C173 or ASTM C231, for each composite sample taken in accordance to ASTM C172.

H. Defective Concrete:

1. Should strength of any grade of concrete, for any portion of Work indicated by tests of molded cylinders and core tests, fall below minimum 28 days strength specified or indicated, concrete will be deemed defective Work and shall be replaced or adequately strengthened in a manner acceptable to the Architect and DSA.

2. Concrete Work that is not formed as indicated, is not true within 1/250 of span, not true to intended alignment, not plumb or level where so intended, not true to intended grades and levels, contains sawdust shavings, wood or embedded debris, or does not fully conform to Contract provisions, shall be deemed to be defective Work and shall be removed and replaced.

I. Concrete for Equipment Pads, Mechanical and Electrical Work: Unless otherwise indicated, strength shall have a minimum $f'c$ = 3,000 psi. Exposed concrete shall be provided with a hand trowel finish with radius corners and edges. Form and place concrete where necessary as described in Section 03100: Concrete Forms and Accessories, and reinforced as described in Section 03200: Concrete Reinforcement. Calcium chloride shall not be furnished in any concrete mix provided for the installation of underground electrical conduits. For concrete encasement of more than one conduit, furnish 3/4 inch maximum aggregate.

3.9 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.10 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 03450 - ARCHITECTURAL PRECAST CONCRETE

1. GENERAL

1.1 DESCRIPTION

A. Section Includes
   1. Structural design and detailing of stair treads (products).
   2. Plant fabrication of architectural precast concrete stair treads.
   3. Transportation of precast stair treads to job site.
   4. Installation (erection) of precast stair treads.

B. Related Documents: The requirements of the General Conditions, Supplementary General Conditions and applicable portions of Division 1 of these Specifications as they apply to this Section.

C. Related Sections :
   1 Section 03 20 00 - Concrete Reinforcement
   2. Section 03 30 00 - Cast-in-Place Concrete
   3. Section 05 12 00 - Structural Steel
   4. Section 05 50 00 - Metal Fabrications
   5. Section 07 60 00 - Flashing and Sheet Metal
   6. Section 07 92 00 - Joint Sealants

1.2 REFERENCES

A. California Building Code, 2010 Edition.
B. PCI MNL-120-92: PCI Design Handbook, Precast and Prestressed Concrete, Fourth Edition
C. PCI MNL-1 17-96: Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products
D. PCI MNL-1 16-85: Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products
E. AWS Dl. 1 -96: Structural Welding Code - Steel
F. AWS Dl.4-92: Structural Welding Code - Reinforcing Steel
G. ASTM A27M : Steel Castings, Carbon, for General Application
H. ASTM A36M: Structural Steel
1. ASTM A47M : Ferritic Malleable Iron Castings
J. ASTM A53: Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
K. ASTM Al 08: Steel Bars, Carbon, Cold-Finished, Standard Quality
L. ASTM Al 23: Zinc Coatings on Iron and Steel Products
M. ASTM Al 53M: Zinc Coating (Hot-Dip) on Iron and Steel Hardware

N. ASTM Al 84M: Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
0. ASTM Al 85: Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
P. ASTM A307 : Carbon Steel Bolts and Studs, 60,000 Tensile Strength
Q. ASTM A325M: High-Strength Bolts for Structural Steel Joints
R. ASTM A416M: Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
S. ASTM A449: Quenched and Tempered Steel Bolts and Studs
T. ASTM A496: Steel Wire, Deformed, for Concrete Reinforcement
U. ASTM A497: Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
V. ASTM A500 : Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in
Rounds and Shapes
W. ASTM A563M: Carbon and Alloy Steel Nuts
X. ASTM A572M: High-Strength Low-Alloy Columbium-Vanadium Structural Steel
Y. ASTM A615M: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
Z. ASTM A706M: Low-Alloy Steel Deformed Bars for Concrete Reinforcement
AA. ASTM B633 : Electrodeposited Coatings of Zinc on Iron and Steel
BB. ASTM B766: Electrodeposited Coatings of Cadmium
CC. ASTM C33: Concrete Aggregate
DD. ASTM C 1 50: Portland Cement
EE. ASTM C260 : Air-Entraining Admixtures for Concrete
FF. SAE J429 : Mechanical and Material Requirements for Externally Threaded Fasteners
GG. DOD-P-21035

1.3 SYSTEM DESCRIPTION

A. Plant fabricated precast stair treads consisting of architectural concrete, steel reinforcement, steel connections for panel attachment to structure, and other inclusions for attachments to stair treads. Stair treads are transported to the job site for installation.
B. Precast panel fabrication shall include all labor, materials, and equipment necessary to manufacture the stair treads as shown by the Contract Documents.
C. Stair treads installation shall include all labor, materials, and equipment necessary for the installation of the stair treads as shown by the Contract Documents.
D. The stair treads Manufacturer shall design and furnish all precast connection hardware to be attached to or embedded in the stair treads; shall furnish all loose connection hardware, and shall furnish all connection hardware required to be embedded in the cast-in-place concrete for connection of the precast stair treads. The placement of the hardware in the cast-in-place concrete will be the responsibility of the General Contractor.

E. Embeds and hardware which are to be cast into the precast stair treads for other trades shall be provided to the Precast Manufacturer, with instructions, in a timely manner in order not to disrupt or delay production. All such embeds and hardware shall be fully defined in contract drawings.

F. The Precast Manufacturer shall design, furnish, and install steel preweld required (such as outriggers and downriggers) to carry the loads from the precast stair treads to the structure.

1.4 QUALIFICATIONS

A. Design: Precast stair treads shall be designed under the supervision of a structural engineer registered in the state of California employed or retained by the Precast Manufacturer, using the accepted principles of design as stipulated in the PCI Design Handbook, Precast and Prestressed Concrete MNL-120. All design loads shall meet the requirements of the Uniform Building Code.

B. Manufacturing: The precast manufacturing plant shall be certified at the time of bid by the Precast/Prestressed Concrete Institute Plant Certification Program for Group A1 and/or be a participant in the PCMAC Quality Assurance Program.

OR

Acceptable Manufacturers:
1. FQC Precast Solution – contact Chuck Gramlich (949) 413-7408
2. Clark Pacific
3. Coreslab Structures (L.A.) Inc
4. Approved equal.

C. Erector: Regularly engaged for at least 5 years in erection of architectural precast stair treads similar to those required on this project. The present erection management team shall be capable of installing the required stair treads without causing delay of project schedules.

D. Welders (Shop, Plant and Field): Welders performing work under this specification shall be qualified in accordance with AWS D1.1, as required to perform work at all stages of production and erection.

E. Testing: Precast Manufacturer shall comply with the testing provisions in MNL-117, Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

3.7 SUBMITTALS

A. Submit all information under provisions of Division 1.

B. Samples:
   1. Submit preliminary samples, approximately 12" by 12", representative of finished exposed face.

C. Shop and Erection Drawings: Submit seven (7) copies showing;
   1. Material specifications,
   2. Floor plans identifying location of stair treads,
   3. Floor plans identifying location of pre-erection attachments (i.e. cast-in-place embeds and prewelds) to support structure,
   4. Elevations identifying location of stair treads and their connections,
   5. Details as necessary to describe relationship of stair treads to adjacent material,
   6. Details of panel connections,
   7. Description of all hardware cast into stair treads, sent loose to the job site, and cast into or attached to supporting structure,
   8. Elevations and sections of typical stair treads showing;
      a. geometry and finish,
      b. thickness of face and back-up mixes (if applicable),
      c. reinforcement layout,
      d. stripping, lifting, and erection insert sizes and locations,
      e. embeds with piece marks and their locations.

D. Mix Designs: Submit all precast mix designs for approval. Mix designs shall be prepared by an independent testing facility or qualified employee of the Precast Manufacturer.

E. Weld Procedure Specifications: Submit Welding Procedure Specifications in accordance with AWS Dl.1 and Dl.4 requirements for all welding which will be performed under this Section.

F. Design Calculations : Submit complete design calculations for stair treads types and connections including loads used in design.

G. Design Modifications:
   1. Submit design minor modifications necessary to meet performance requirements and field conditions.
   2. Variations in details or materials shall not adversely affect the appearance, durability or strength of stair treads.
   3. Maintain general design concept without altering size of members, profiles and alignment unless otherwise approved by the Architect/Engineer.

1.6 QUALITY ASSURANCE

A. Full-Scale Panel:
   1. After standard samples are accepted for color and texture, produce full-scale stair treads meeting design requirements. This stair tread shall be viewed and approved by the Architect at the precast plant.
   2. The full-scale stair treads shall be representative of standard quality for precast panel work, when accepted by Architect.
   3. Incorporate full-scale panel into work after keeping panel in plant for checking purposes.

B. In-Plant Quality Control
   1. The Precast Manufacturer shall have an established PCI and/or PCMAC quality control program in effect prior to bidding. If requested, a copy of this program shall be submitted to the Architect.
   2. Testing of materials and inspection of production techniques shall be the responsibility of the Precast Manufacturer's Quality Control Department.
   3. Keep quality control records available for two years after final acceptance.
   4. Keep certificates of compliance available for five (5) years after final acceptance.

C. All other site testing and inspection to be provided by Owner.

2.0 - PRODUCTS

2.1 PRECAST CONCRETE MATERIALS

A. Portland Cement
   1. Architectural Mixes : ASTM C150 Type II cement. For surfaces exposed to view in the finished structure use same brand, type and source of supply throughout the precast production.

B. Aggregates : Fine and coarse aggregate for mix shall conform to ASTM C33 except for gradation. Aggregates shall be clean, hard, strong, durable, inert, and free of staining and deleterious materials. Maximum size of aggregate is ¾".

C. Water : Free from deleterious matter that may interfere with the color, setting, or strength of the concrete.

D. Admixtures: Conforming to ASTM C260 and/or ASTM C494.

E. Concrete Strength : Concrete strength shall be determined by design with a minimum 28 day design strength of 3,500 psi.

2.2 STEEL PRODUCTS

A. Structural Shapes, Bars & Plates (1.6 mm and thicker).....ASTM A36M
B. Pipe.....ASTM A53 Grades A or B
C. Tube Steel.....ASTM A500 Grades A or B
D. Reinforcing Steel.....ASTM A615M Grades 300 & 420 or ASTM A706M
E. Prestressing Strand.....ASTM A416M Grade 1860
F. Deformed Steel Bar Mats.....ASTM Al 84
G. Deformed Bar Anchors.....ASTM A496
H. Deformed Welded Wire Fabric.....ASTM A497
1. Plain Welded Wire Fabric.....ASTM Al 85
J. Welded Headed Studs.....AWS Dl.1 Type B
K. Standard Machine Bolts.....ASTM A307 Grade A or SAE J429 Grade 2
L. Standard Studs/Threaded Round Stock (UNC).....ASTM A307 Grade C, ASTM A572M Grade 345
M. Nuts for Standard Machine Bolts and Threaded Studs ASTM A563M Grade A Hex Nuts
N. High Strength Machine Bolts ..... ASTM A325M Type 1, ASTM A449 Type 1, or SAE J429 Grade 5
O. Nuts for High-Strength Machine Bolts and Threaded Studs ... ASTM A563M Grade A ..... Heavy Hex Nuts
P. Coil Rods and Bolts....ASTM A108 - SAE 1016 to 1026, F„/Fy = 480/380 MPa minimum
Q. Coil Nuts for Coil Rods and Bolts .... Nuts passing a proof load stress of 80 ksi, based on the tensile stress area of the matching coil rods and bolts.
R. Malleable Iron Castings.....ASTM A47M Grade 2201 0
S. Carbon Steel Castings.....ASTM A27M Grade 415-205

2.3 STEEL PROTECTIVE COATINGS: All connection hardware exposed to weather after completion of building shall be hot-dip galvanized. All connection hardware not exposed to weather after completion of building may be uncoated, except as otherwise explicitly requ ired by the contract drawings. Fasteners can have either an electroplated zinc or cadmium coating.

A. Alkyd Rust Inhibitive Primers (shop primers such as red iron oxide)
   1. Tnemec Series FD88 Azeron Primer
   2. Ameron 5105
   3. Substitutions : Under provisions of Division 1.

B. Zinc Coatings:
   1. Hot-Dip Galvanizing.....ASTM Al 23, or ASTM Al 53M
   2. Electroplated Zinc for Steel Products and Steel Hardware.....ASTM B633
   3. Zinc Rich Paints.....DOD-P-21035

C. Cadmium Coatings:
   1. Electrodeposited Coatings of Cadmium.....ASTM B766

2.4 FABRICATION

A. Precast Manufacturer shall not proceed with fabrication of stair treads prior to receiving the reviewed set of Shop Drawings and the Architect's acceptance of submitted Samples.
B. Manufacturing procedures shall be in general compliance with PCI MNL-1 17.
C. Batching of Concrete shall be in accordance with approved Mix Design(s).
D. Forms :
   1 . Forms for precast stair treads shall be rigid and constructed of materials that will result in finished products conforming to the profiles, dimensions and tolerances indicated by this Section, the Contract Documents and the reviewed Shop Drawings.
   2. Construct forms to withstand vibration method selected.
   3. Release agents shall be applied and used according to manufacturer's instructions.
E. Cover : Minimum concrete cover for rebar, inserts and embeds shall be 20 mm, where applicable.
F. Concreting :
   1. Convey concrete from the mixer to place of final deposit by methods which will
      prevent separation, segregation or loss of material.
   2. Consolidate all concrete in the form to minimize unintentional pour lines, honeycombing or entrapped air on vertical surfaces.
G. Curing : Procedures sufficient to insure specified concrete strength of all precast stair treads must be employed. Stripping of a panel shall not occur until concrete strength is sufficient to prevent cracking or breaking of the panel.
H. Manufacturing Tolerances :

   1. ¼" max in 10' – length.

I. Stair Treads Identification :
   1. Mark each precast stair tread to correspond to identification mark on Shop Drawings for panel location.
   2. Mark each precast stair tread with casting date.

J. Stair Treads Finish and Approval: Precast Stair Treads and approved Samples shall be viewed side by side from a distance of 6 m when comparing texture and color. Precast stair treads which do not reasonably match the color and texture of the approved sample(s), the dimensional tolerances, or industry standards may. be rejected at the option of the Architect if they cannot be satisfactorily corrected

K. Contrasting Vision Stripe – CBC Section 1133B.4.4: Provide 2" contrasting color warning stripe of material at least as slip resistant as the other treads of the stiars, 1" max. from edge of nosing and top landing. At exterior stairs, provide warning stripe at top landing and all tread nosings.

3.0 - EXECUTION

3.1 PRODUCT TRANSPORTATION AND HANDLING

A. Handle and transport stair treads in a position consistent with their shape and design in order to avoid excessive stresses or damage.

B. Lift or support stair treads only at the points shown on the Shop Drawings.

C. Support stair treads during shipment on non-staining shock-absorbing material as needed to
prevent damage.

3.2 PRE-INSTALLATION RESPONSIBILITY

A. Erector's Responsibility : Prior to installation of the precast stair treads, notify the General Contractor of any discrepancies discovered which affect the work under this contract. Commencement of installation does not constitute acceptance of the structure.

3.7 ERECTION

A. Unloading Areas and Access : Clear all-weather unloading areas and access roadways around the building and in the building (where appropriate) shall be provided and maintained by the General Contractor so that the hauling and erection equipment for the precast stair treads may operate under their own power.

B. Safety Aspects : The General Contractor shall provide all required traffic controls, barricades, warning lights and/or signs to insure a safe installation.

C. Setting : Precast stair treads shall be lifted with suitable lifting devices at points provided by the Precast Manufacturer to prevent excessive stresses or damage to the stair treads.

D. Temporary Supports and Bracing : The erector shall provide temporary supports and bracing as required to maintain position, stability and alignment until stair treads are permanently connected.

E. Tolerances of Erected Stair Treads : Tolerances for location of precast stair treads shall be as listed below;
1. ¼" max in 10' – length.

F. Final Connection of Stair Treads to Structure :
1. Precast stair treads shall be attached to the structure as shown on the reviewed Shop Drawings.

2. All modifications made to details shown on Shop Drawings shall be submitted for review.
3. Welding shall not be performed prior to receipt of the approved submitted Weld Procedure Specifications.

G. Connection Verification: The Erector shall verify that all connections are made per reviewed connection details.

3.4 JOB SITE STORAGE, HANDLING, AND PROTECTION:

A. Erector shall be responsible for the repair of damage to precast stair treads that is caused by its own crew.

B. After precast stair treads are installed in their final positions, the General Contractor shall be responsible for their protection.

3.5 PATCHES AND REPAIRS:

A. Patching of stair treads, when required, shall be performed to the Architect's satisfaction and consistent with industry standards.

B. Repairs shall be sound, permanent and flush with adjacent surface.

C. From a distance of 20' all repairs must be of color and texture matching adjoining surfaces and showing no apparent line of demarcation between original and repaired work.

3.6 CLEANING

A. Cleaning methods shall be approved by Precast Manufacturer.

B. Erector shall clean erection marks from precast stair treads upon erection, when exposed to view.

C. Precast Manufacturer is responsible for providing a clean panel to Erector.

D. Use care to prevent damage to precast surfaces and to adjacent materials.

E. Surface must be thoroughly rinsed with clean water immediately after using cleaner.

F. At completion of the project, General Contractor shall be responsible for final cleaning and wash down of building.

3.7 SEALER AND/OR ANTI-GRAFFITI (where used):

A. Seal exposed precast surfaces with one coat of water repellant coating in accordance with product manufacturer's recommendations and Section 07901 – Joint Sealants..

B. Surfaces to be free of dirt, dust, and other foreign material immediately prior to sealer application. Precast Manufacturer, at his option, may factory apply sealer.

C. Patches or other work on panel surfaces which have removed sealer shall be resealed by the responsible party.

3.8 INSPECTION AND ACCEPTANCE: Immediately after erection is completed, inal inspection and acceptance of the erected precast stair treads shall be made by the Architect and General Contractor to verify conformance with plans and specificatins. In cases where precast stair treads installation is phased, stair treads shall be inspected and approved in phases.

3.9 WARRANTY: All labor and materials under the Precast Manufacturer's contract shall be warranted by the Precast Manufacturer for a period of one (1) year following final approval of the precast panel by the Architect. Any additional labor or material warrantees, i.e. caulking, shall be passed through to the General Contractor with no responsibility by the Precast Manufacturer.

END OF SECTION

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SECTION 04 82 00

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this section.

B. Section Includes:

1. Concrete masonry units.
2. Reinforcing steel.
3. Mortar, grout and grouting.
4. Bolts, anchors, hardware, metal frames, and other insert items.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection.
2. Section 03 10 00: Concrete Forms and Accessories.
3. Section 03 20 00: Concrete Reinforcement.
4. Section 03 30 00: Cast-In-Place Concrete.
5. Section 05 12 00: Structural Steel.
6. Section 08 11 13: Steel Doors and Frames.

1.2 REFERENCES:

A. American Society for Testing and Materials International (ASTM):

1. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
2. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
3. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
4. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
5. ASTM C150 - Standard Specification for Portland Cement.
6. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
7. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
8. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
9. ASTM C426 - Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.

10. ASTM C476 - Standard Specification for Grout for Masonry.
11. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
12. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
13. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
14. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

B. Masonry Standards Joint Committee (MSJC):
1. ACI 530.1/ASCE6/TMS602 – Specification for Masonry Structures.
2. ACI 530/ASCE5/TMS402 – Building Code Requirements for Masonry Structures.

1.3 SUBMITTALS

A. Mix Design: Submit grout and mortar mix designs. Mix designs shall be signed and sealed by a Civil or Structural Engineer registered in the State of California.

B. Product Data: Submit manufacturer's Product Data for assembly components, materials, and accessories. Submit certificates and data assuring that the proposed materials meet the specified ASTM standards.

C. Samples: Submit Samples for each type of required masonry unit, including reinforcement and accessories.

D. Shop Drawings: Indicate wall reinforcement, splice locations and bending diagrams.

E. Admixtures: Additives and admixtures to mortar and grout shall not be used unless approved by the enforcing agency. Submit product data for any proposed admixture.

1.4 REGULATORY REQUIREMENTS

A. Perform the Work in accordance with CBC, Chapter 21A.

B. Comply with requirements of ACI 530.1.

1.5 QUALITY ASSURANCE

A. Comply with the requirements of Specification Section 01420, CBC Chapter 21A, and ACI 530 and 530.1.

B. Concrete Masonry Units:

1. Notify the testing laboratory a minimum of 45 days in advance of installing concrete unit masonry, to allow for preconstruction testing of the units.
    a. Units will be sampled and tested in accordance with ASTM C140 for compressive strength, absorption and moisture content.
    b. Units will be sampled and tested in accordance with ASTM C426 for linear drying shrinkage.
2. The material testing laboratory shall receive concrete masonry unit specimens for testing from masonry unit manufacturer. Number of specimens shall be as indicated in referenced ASTM standard tests. Testing laboratory will perform and send test results to the Architect and IOR.

C. Portland Cement: Submit certification from the cement manufacturer that the cement proposed for use on the project has been manufactured in accordance with ASTM C150. Certification shall include test results made on cement samples during production.

D. Mortar and Grout Tests: At the beginning of all masonry work, mortar and grout will be tested in accordance with CBC Section 2105A.5.
1. Mortar: Shall conform to ASTM C270 and to the property specifications of CBC Table 2103A.8(2) for Type S mortar.
    a. Provide qualifications of mortar as meeting ASTM C270 at the beginning of the job and whenever mix design is changed.
    b. Mortars will be evaluated during preconstruction, sampled and tested during construction for proportioning and compressive strength in accordance to ASTM C780 and ASTM C1586.
    c. Tested mortar strength shall meet or exceed 900 psi at 7 days and 1,800 psi at 28 days.
2. Grout: Shall conform to ASTM C476, and will be sampled and tested in accordance with ASTM C404 and ASTM C1019. Compressive strength shall equal or exceed specified compressive strength ($f'm$) at 28 days, but not less than 2,000 psi.
    a. Ready-Mix Grout: Grout manufacturer shall furnish batch ticket information in accordance to ASTM C94.

E. Masonry Core Testing: Core testing will be performed in accordance with CBC, Section 2105A.4. Masonry removed by coring operations shall be replaced to match adjoining work.

F. Inspection During Installation: A special inspector will continuously observe the installation of reinforced masonry. The IOR shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.

H. The Owner will be responsible for the costs of original tests and inspection.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store units above grade on level platforms or pallets to allow air circulation under stacked units, in a dry location.

B. Store cementitious materials and aggregates in such a manner as to prevent deterioration or intrusion of foreign matter or moisture.

C. Handle units on pallets or flat bed barrows. Free discharge from conveyor units or transportation in mortar trays is not permitted.

D. Cover and protect against wetting before installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Unit Masonry: Modular medium weight conforming to ASTM C90, grade N-1, hollow load-bearing concrete unit masonry. Minimum compressive strength of units shall be 1,900 psi.

1. Provide blocks by Orco, Angelus Block, or equal.
2. Provide open-end units at walls to be grouted.
3. Provide closed-end units at walls and at openings where ends will be exposed in finish Work; provide bond beam blocks where horizontal reinforcement is indicated.
4. Provide special shapes and accessory units at locations indicated on Drawings.
5. Provide units in colors and textures as indicated in the drawings.
6. Masonry unit shall have been cured for a minimum of 28 days.
7. Masonry unit shall have maximum liner shrinkage of 0.06 percent from saturated to oven dry.

B. Portland Cement: ASTM C150, Type II, from one source.

C. Hydrated Lime: ASTM C207, Type S.

D. Aggregates: ASTM C144 for mortar and ASTM C404 for grout.

E. Mortar: ASTM C270, Type S, conforming to the property specifications of CBC Table 2103A.8(2). Provide mortar color as indicated in the drawings.

F. Grout: ASTM C476. Ready-mixed grout shall be manufactured and delivered to the jobsite in accordance to ASTM C94.

G. Admixture for Grout: Grout Aid Type 2, as manufactured by Sika Chemical Corp., or equal.

H. Water: Clean, potable, free from substances deleterious to mortar, grout or reinforcement.

I. Reinforcing Steel: Provide and install reinforcing steel in accordance with Specification Section 03200, Concrete Reinforcement.

J. Cleaning Materials: Sure Klean No. 600 detergent by ProSoCo.

K. Miscellaneous Materials: As required to complete the Work.

L. Anchor Bolts: Shall be hex headed bolts conforming to ASTM A307 Grade A with the dimensions of the hex head conforming to ANSI/ASME B18.2.1, unless noted otherwise on structural drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Discard units with cracks or other defects not complying with requirements of ASTM C 90.

3.2 CONSTRUCTION

A. Construct per applicable provisions of CBC and ACI 530.1.

B. Conform to ACI 530.1 for hot and cold weather masonry construction.

3.3 MORTAR AND GROUT MIXING

A. Mortar: Shall provide a minimum strength of 1800 psi. Dry, loose volumes. Mix proportions will be verified by material testing laboratory.

B. Grout: Shall provide a minimum strength of 2,000 psi or as indicated in the drawings, whichever is higher. Grout space requirements for coarse and fine grouts shall be per Table 7 of ACI 530.1. Add Sika Chemical Corp. Grout Aid per manufacturer's instructions.

C. Measurements: Proportion by accurate volume measurements. Measure in calibrated devices that can be checked at any time.

1. Add water for workable consistency.
2. Shovel measurements are not permitted.

D. Mixing: Mix in accordance to ACI 530.1.

1. Mortar: Place sand, cement, and water in mechanically operated mixer in that order, while mixer is running; mix for 3 minutes, add lime, and admixture (for

grout), and continue mixing until a uniform mass is provided, but in no case less than 10 minutes. Measurement of ingredients shall be by volume. Mix dry ingredients with a sufficient amount of water to provide a workable mix. Batches of less than one sack of cement, and fractional sack batches are not permitted.

2. Factory Blended Mortar: Mix in accordance with manufacturer's recommendations.
3. Grout: Add sufficient water for a workable mix that will flow into all voids of the masonry without separation or segregation. Grout slump shall be between 8 and 11 inches.

E. Re-tempering Time Limit: Use mortar within one hour after mixing. Discard any mortar that has been mixed longer or that has begun to set. If necessary re-temper within this time limit, by replacing only water lost due to evaporation and by thoroughly remixing.

3.4 INSTALLATION OF MASONRY UNITS

A. Workmanship: Install masonry plumb and true to line with straight level joints of uniform thickness. Comply with ACI 530.1 tolerances. Maintain masonry clean during and after installation.

1. Lay-out and incorporate embedded hardware items.
2. Assist other trades with built-in items, which require cutting and fitting of masonry.
3. Cut block units with a diamond saw or carborundum wheel. Trowel or chisel cutting is not permitted.
4. Keep cavities clear of droppings and debris. Remove droppings prior to grouting.

B. Reinforcing Steel: Install as indicated on Drawings. Except as otherwise indicated, install reinforcement in accordance with standards of Concrete Reinforcing Steel Institute and to requirements specified in Specification Section 03 20 00, Concrete Reinforcement. Do not splice vertical reinforcement except where indicated on the Drawings.

C. Shoring: Provide temporary shoring for lintels with sufficient strength to carry load without deflecting. Remove temporary shoring 28 days after masonry has been installed.

D. Block Installation: Clean dirt and dust from surfaces before installation. Do not wet masonry units.

1. Foundation preparation: Sandblast tops of concrete starting surfaces, wash-off by high pressure water jet, and slurry coat surfaces with neat cement grout for bond to masonry.
2. Install masonry with mortar to required joint thickness. Install blocks with 3/8-inch mortar bed on entire horizontal surface. Fill head joints solid, install tightly to adjoining units. Provide 3/8-inch joint thickness.
   a. Hold racking to a minimum.
   b. No toothing is permitted.
   c. If it becomes necessary to move a unit after it has been installed, remove the unit, discard the mortar, and install the unit in fresh mortar.
3. Anchor Bolts: Provide one-inch minimum grout space between bolts and masonry..
4. Bond: Unless otherwise indicated, install units in common running bond.
5. Finish Joint Treatment: Unless otherwise indicated, cut both interior and exterior joints flush, and tool slightly concave to a dense, uniform surface.
6. Grouting: Unless noted otherwise on Drawings, completely fill cells with grout.

E. Steel Door Frames:
1. Locate door frames accurately, install plumb, "Ram-set" or "Rawlplug" to floor surface and brace in position before start of masonry installation.
   a. Frames are specified to be furnished with adjustable anchors.
   b. Fill interior of frames solid with mortar or grout as walls are constructed.
2. Provide temporary wood spreaders from jamb to jamb and from head to floor to ensure that jambs do not bow-in, distort from a straight line, or deflect from superimposed loads during construction.

3.5 GROUTING

A. Prior to grouting all cells shall be cleaned so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch, loose mortar or foreign material.

B. Grout materials and water contents shall be controlled to provide adequate fluidity for placement without segregation of the constituents, and shall be mixed thoroughly. Reinforcement shall be properly positioned and solidly embedded in the grout.

C. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

D. Between grout pours, a horizontal control joint shall be formed by stopping all wythes at the same elevation and with the grout stopping at 1-1/2 inches below a

mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of 1/2 inch below the top of the masonry.

3.6 LOW-LIFT GROUTING FOR HOLLOW MASONRY UNITS

A. Grouting shall meet the requirements of CBC Section 2104A.6.1.1.2.

B. After mortar joints have set, cells are cleaned of mortar and debris, and reinforcement is installed and inspected, grout cells in 4 feet maximum lifts. Horizontal and vertical reinforcement shall be held in place by suitable devices.

C. Grout may be installed by pump, tremie or bucket, using hoppers to avoid spilling on exposed surfaces.

D. All grout shall be consolidated with a mechanical vibrator after placing so as to completely fill all voids and to consolidate the grout. Grouted walls shall be solid and without voids

E. Units shall be laid a maximum of 4 feet before grouting, and all over-hanging mortar and mortar droppings shall be removed. Grouting shall follow each 4 feet of construction laid and shall be consolidated so as to completely fill all voids and embed all reinforcing steel. Stop grout pours 1-1/2 inches below top of each lift. When grouting is stopped for 1 hour or longer, horizontal construction joints shall be formed by stopping the pour of grout not less than ½ inch or more than 2 inches below the top of the uppermost unit grouted. Horizontal steel shall be fully embedded in grout in an uninterrupted pour.

F. Place an initial 2 feet high lift around, thoroughly compact, then place balance of each lift, compacting again through total lift, with hardwood spading sticks or pencil vibrators.

G. Remove and discard spilled grout from upper units before grout can harden.

H. Bracing: Adequately brace walls against wind and other forces during and after construction.

I. Re-puddle top of grout after initial set.

J. Placement of reinforcement/bolts/embeds shall conform to CBC section 2104A.6.2.

3.7 HIGH-LIFT GROUTING OPTION FOR HOLLOW MASONRY UNITS

A. Grouting shall meet the requirements of CBC Section 2104A.6.1.1.3 and DSA IR 21-2.

B. High-lift grouting shall apply only to cell sizes available with 8 inch and wider block units. This method is limited to conditions where openings, block pattern

arrangements, special reinforcing steel, or embedded structural steel details do not prevent the free flow of grout or inhibit the use of mechanical vibration.

C. Provide bond beam units, inverted for start course, and omit alternate blocks or cut openings in alternate face shell on bottom course for cleanouts. Use of open-end concrete masonry units is preferred wherever possible and is required at stacked bond conditions. Cleanout openings shall be provided in every reinforced cell at the bottom of each pour of grout. Alternatively, if the course at the bottom of the pour is constructed entirely of inverted open-end bond beam units, cleanout openings need only be provided in every reinforced cell at the bottom of each pour of grout. Cleanouts shall be sealed before grouting.

D. Remove projecting mortar fins. Wash out every cell thoroughly using a water jet, which has sufficient force to remove mortar from the interior of the cells, and from reinforcing steel. The foundation or other horizontal construction joints shall be cleaned of all loose material and mortar droppings before each pour.

E. Plug each cleanout by setting a face shell in mortar into opening and securely bracing it in place to prevent displacement. If masonry is not exposed in finish Work, cleanouts may be formed.

F. Grouting:

1. Grout masonry cells solid, free from voids, to top of wall in lifts not exceeding 4 feet in height. Horizontal intermediate construction joints are not permitted.
2. Do not install grout until masonry has set a minimum of 3 days in warm weather (50 degrees to 85 degrees F.) or 5 days in cool, damp weather (35 degrees to 50 degrees F.).
3. Pump grout into grout cell space as rapidly as practical. Discard grout not in place within one hour after water was first added to batch.
4. Install grout with maximum slump without segregation. Place in a continuous pour, in maximum lifts of 4 feet, with approximately 30 to 60 minutes elapsed time between any 2 successive lifts under normal weather conditions. An approved admixture that reduces early water loss and produces an expansive action shall be used in the grout.
5. Grout shall be consolidated in accordance with CBC section 2104A.6.2.
6. An approved admixture that reduces early water loss and produces and expansive action shall be used in the grout.

G. Consolidating:

1. Consolidate and reconsolidate grout using 3/4 inch lightweight flexible cable vibrators.
2. First consolidation shall be performed to bottom of lift immediately after placement, and in case of subsequent lifts, through previously placed lift.

3. Top lift shall be reconsolidated no sooner than 30 minutes after grout has been installed.
4. Vibrating of reinforcing steel is not permitted.

H. Bracing: Adequately brace walls against wind and other forces during and after construction.

I. Placement of reinforcement/bolts/embeds shall conform to CBC section 2104A.6.2.

J. Wall Ties: When stacked bond is used, or when adequate cross webs between face shells are not provided, heavy gage wire embedded in the horizontal mortar joints should be provided across continuous vertical joints or between face shells to prevent blowouts. External ties or braces may also be used for this purpose.

K. Inspections and Testing: All masonry work is required to be continuously inspected during laying and grouting by an inspector specially approved for that purpose by DSA. Core tests shall be performed in accordance with DSA IR 21-2.

3.8 CURING

A. Remove efflorescence, stains, debris, excess grout, and foreign matter.

B. During curing, or for any other purpose, do not saturate masonry with water.

C. For low-humidity conditions, dampen the wall surface with a very light fog spray continuously for 3 days to cure mortar in joints.

3.9 PARGE COAT

A. Apply parge coat to the earth side of surfaces that are to receive waterproofing.

B. A Portland cement and sand mix (1:3.5 by volume) or Type S mortar may be used for the parge coat.

C. Parging should be applied to damp (not saturated) concrete masonry in two 1/4 inch thick layers. The first coat should be roughened when partially set, hardened for 24 hours, and then moistened before second coat is applied. The second coat should be trowelled to a smooth, dense surface.

D. The parge coat should be beveled at the top to form a wash, and thickened at the bottom to form a cove between the base of the wall and the top of footing.

3.10 CLEANING

A. At completion of masonry Work, remove misplaced mortar, grout or other foreign substances, and clean surfaces which will be exposed in finish Work with specified cleaner, or with clean water and stiff fiber brushes.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.11 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Structural steel.

2. Architecturally exposed structural steel.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection.

2. Section 03 30 00: Cast-In-Place Concrete.

3. Section 04 82 00: Concrete Unit Masonry.

4. Section 05 30 00: Metal Decking.

5. Section 05 50 00: Metal Fabrications.

6. Section 09 91 00: Paints and Coatings.

1.2 REFERENCE STANDARDS, SPECIFICATIONS AND CODES

A. CBC Chapter 22A.

B. American Institute of Steel Construction (AISC):

1. AISC – Steel Construction Manual, 13th Edition, including:.

a. AISC 360 Specifications for Structural Steel Buildings.

b. AISC 303 Code of Standard Practice for Steel Buildings and Bridges.

c. RCSC – Specification for Structural Joints Using ASTM A325 or A490 Bolts.

2. AISC 341 - Seismic Provisions for Structural Steel Buildings, March 9, 2005, including Supplement No. 1, November 16, 2005.

3. AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.

C. American Society for Testing and Materials (ASTM):

1. ASTM A36 – Standard Specification for Carbon Structural Steel.

2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

3. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

4. ASTM A123 – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

5. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

6. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.

7. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 Ksi Minimum Tensile Strength.

8. ASTM A435 - Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates.

9. ASTM A490 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

10. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

11. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

12. ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

13. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

14. ASTM A673 - Standard Specification for Sampling Procedure for Impact Testing of Structural Steel,

15. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

16. ASTM A992 – Standard Specification for Structural Steel Shapes.

17. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

18. ASTM E23 - Standard Test Methods for Notched Bar Impact Testing of Metallic Materials.

19. ASTM E112 - Standard Test Methods for Determining Average Grain Size

20. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-Ksi Yield Strength.

21. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

22. ASTM F1852 – Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tension Strength.

D. American Welding Society (AWS):

1. AWS D1.1 – Structural Welding Code - Steel.

2. AWS D1.8 – Structural Welding Code – Seismic Supplement.

2. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

3. AWS B2.1 – Specifications for Welding Procedures and Performance Qualification.

E. SSPC – Steel Structures Painting Council:

1. SP-2 - Hand Tool Cleaning.

1.3 SYSTEM DESCRIPTION

A. Regulatory Requirements:

1. Structural steel shall conform to CBC requirements, except that steel manufactured by acid Bessemer process is not permitted for structural purposes.

2. Sheet and strip steel other than those listed in CBC, if provided for structural purpose, shall comply with DSA requirements.

1.4 SUBMITTALS

A. Shop Drawings:

1. Submit Shop Drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures and diagrams showing the sequence of erection. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar detailing as shown in the Contract Documents. Include a fully detailed, well controlled sequence and technique plan for shop and field welding that minimizes locked in stresses and distortion; submit sequence and technique plan for review by the Architect.

a. Include details of cuts, connections, camber, and holes in accordance with Figure 4.5 of AWS D1.1 or AISC 360 Section J1.8, weld position plan and other pertinent data. Indicate welds by

standard AWS symbols, and show size, length and type of each weld.

b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for Work specified in other sections.

c. Erection and Bracing Plan and Erection Procedure: Submit an erection and framing plan, including columns, beams, and girders, signed and sealed by a Structural or Civil Engineer registered in the State of California in accordance with Title 8 CCR, Section 1710, Erection of Structures. Maintain a copy at the Project site as required by the California Division of Industrial Safety.

d. Submit a list of steel items to be galvanized.

e. Include identification and details of AESS members, if applicable.

B. Product Data:

1. Submit copies of fabricator's specifications and installation instructions for the following products. Include laboratory test reports and other data required demonstrating compliance with these Specifications:

a. Structural steel, each type; including certified copies of mill reports covering chemical and physical properties.

b. Welding electrodes.

c. Welding gas.

d. Unfinished bolts and nuts.

e. Structural steel primer paint.

f. High-strength bolts, including nuts and washers.

C. Manufacturer's Mill Certificate:

1. Submit, certifying that products meet or exceed specified requirements.

D. Mill Test Reports:

1. Submit manufacturer's certificates, indicating structural yield and tensile strength, destructive and non-destructive test analysis.

E. Charpy-V-Notch (CVN) Impact Test: Submit certified copies of Charpy-V-Notch (CVN) Impact Test by the manufacturer for applicable steel members and components.

1. Charpy-V-Notch (CVN) Impact Test for Base Metal: Moment frame columns, and girders subjected to Charpy-V-Notch impact test in accordance with AISC 341 Part I, Section 6.3, as modified by Supplement 1.

2. Charpy-V-Notch test shall be performed by the manufacturer employing Test Frequency (P) in accordance with ASTM A673 and utilizing standard specimen sizes shown in Figure 6 of ASTM E23. The absorbed energy in a CVN impact test shall not be less than that specified in Material Part 2 of this section.

F. Submit certified copies of tests by manufacturer for fine grain practice. Structural steel base material, as described above, shall be manufactured to be fully killed and fine grained having grain size number 5 or better as determined by ASTM E112.

G. Welding Procedure Specifications (WPS): Submit weld procedures for all welding on project to Owner's testing laboratory for approval. After approval by testing laboratory, submit to Architect for record. Weld procedures shall be qualified as described in AWS D1.5, section 5.12 or 5.13, AISC 341 and AISC 358, as applicable. Weld procedures shall indicate joints details and tolerances, preheat and interpass temperature, post-heat treatment, single or multiple stringer passes, peening of stringer passes for groove welds except for the first and the last pass, electrode type and size, welding current, polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged, from these averages the weld heat input shall be calculated. Submit the manufacturer's product data sheet for all welding material used. Welding shall not proceed until WPS have been reviewed and approved by the Engineer of Record.

H. Welder's Certificates: Field welders shall be Project certified in accordance with AWS D1.1. Shop welders shall be Project certified for FCAW in accordance with AWS D1.1.

I. Test Reports: Submit reports of tests conducted on shop and field welded and bolted connections. Include data on type of test conducted and test results.

J. Welding Material Certification: Provide certificate that welding material complies to specifications. Submit to Owner's testing laboratory.

1.5 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges", (AISC 303) modified as follows:

a. Replace "Structural Design Drawings" with "Contract Documents' throughout the document.

b. Paragraph 3.2 is hereby modified in it's entirety as follows:

"Contract Documents including but not limited to architectural, mechanical, plumbing, electrical, civil and kitchen design drawings and specifications shall be used as supplement to the structural plans to define configurations and construction information."

c. Delete Paragraph 3.3.

d. In Paragraph 4.4, delete the following sentence:

"These drawings shall be returned to the Fabricator within 14 calendar days."

e. Delete Paragraph 4.4.1.(a) in it's entirety.

f. Paragraph 4.4.2 is hereby modified in it's entirety as follows:

"No review action, implicit or explicit, shall be interpreted to authorize changes in the Contract Documents."

2. AISC 360 - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings

3. AISC 341 – Seismic Provisions for Structural Steel Buildings

4. AISC 358 – Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications

5. Perform welding in accordance with AWS Standards, AWS D1.1, and California Building Code Section 2204A.1 and approved Weld Procedure Specifications (WPS).

6. Structural Joint Reference Specification - The Specifications for Structural Joints Using ASTM A325 or ASTM A490 Bolts established by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation, hereinafter referred to as "Ref Spec".

B. Shop fabrication shall be inspected in accordance with CBC.

C. Erect mock-up panel of fabricated structural steel meeting Architecturally Exposed Structural Steel (AESS) tolerances for exposed areas. Approval by Architect is required. Mock-up to remain for comparison but may not be left as part of the work.

D. Qualifications of Fabricator: Fabricate structural steel in shop of a licensed fabricator, AISC certified, in the same category of the scope of this project. City of Los Angeles certification in lieu of AISC certification is acceptable.

E. Source Quality Control: Refer to Section 01420. Testing Laboratory shall perform conformance testing in accordance with CBC Section 2212A.1.

1. Identified Structural Steel: Tests are waived for steel identified by heat number, accompanied by mill analyses and mill test reports, and properly tagged with an Identification Certificate so as to be readily identified for conformance with applicable ASTM. Comply with CBC Section, 2212A and/or 1704A.

2. Unidentified Structural Steel: Steel not identified and certified as specified above shall be tested according to following requirements. Structural steel fabricator shall cut samples under direction of the Special Inspector and Testing Laboratory shall machine or otherwise prepare the

specimens and perform testing of each 5 tons or fraction thereof for each size of unidentified steel except, in the case of random pieces or of steel having Fy greater than 36 Ksi, testing of each piece is required. Tests required are:

a. For pipe, one tension and elongation test and one flattening test for each size.

b. For all other steel, one tension and elongation test and one bend test for each size.

c. Contractor shall reimburse to Owner all costs paid by Owner for testing unidentified steel.

3. Testing and Inspection of High Strength Bolts, Nuts, and Washers: According to CBC Section 2212A.2 and associated ASTM standards.

F. Erection and Bracing Plan and Procedure: Refer to Section 1710, Title 8, CCR, and Building Code. Employ and pay a California registered civil engineer to prepare an erection and bracing plan and erection procedure for structural steel including columns, beams, and girders, who shall be solely responsible for its compliance. Follow the plan and procedure exactly. Keep a copy at the job site as required by California Division of Industrial Safety. File two copies of stamped erection and bracing plan and procedure for record purposes only, not for review or approval.

G. Testing & Inspection shall comply with the following:

1. CBC Section 2212A.1 Tests of Structural Steel. All steel used for structural purposes shall be identified as required by CBC Section 2203A. Manufacturer's mill analyses and test reports are acceptable for properly identified steel, but the enforcement agency may require additional testing to determine the quality of the steel if there is any doubt as to its acceptability. Any steel not properly identified shall be tested to meet the minimum chemical and mechanical requirements of the ASTM standard appropriate for the steel specified for the structure.

2. EXCEPTION: No mechanical tests are required for unidentified steel when the minimum yield stress required by the design is less than or equal to 25 ksi (172 Mpa) and the steel is not part of the designated lateral-force-resisting system.

3. CBC Section 2212A.2 Tests of High-strength Bolts, Nuts and Washers. High-strength bolts, nuts and washers shall be sampled and tested by an approved independent testing laboratory for conformance with the requirements of Division III.

4. CBC Section 2212A.3 Tests of End-welded Studs. End-welded studs shall be sampled, tested and inspected per the requirements of the Structural Welding Code – Steel, published by the American Welding Society.

5. CBC Section 1704A.3.2.1 Inspection of Shop Fabrication. Inspection of shop fabrication shall be required for significant structural detailed connection and fabrication work as directed by the enforcement agency.

This inspection shall be made by a qualified inspector approved by the enforcement agency. The inspector shall furnish the architect, structural engineer and the enforcement agency with a report that the materials and workmanship conform to the approved plans and specifications.

6. CBC Section 1704A.3.1.1 Inspection of Welding. Inspection of all shop and field welding operations, including the installation of automatic end-welded stud shear connectors shall be made by a qualified welding inspector approved by the enforcement agency. Such inspector shall be a person trained and thoroughly experienced in inspecting welding operations. The inspector's ability to distinguish between sound and unsound welding shall be reliably established. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provisions of the ANSI/AWS QCI-1-96, Standard for AWS Certification of Welding Inspectors published by the American Welding Society. All welding inspectors shall be approved by the enforcement agency.

7. The ability of each welder to produce sound welds of all types required by the work shall be established by welder qualification satisfactory to the enforcement agency.

8. Welding inspection of structural welding shall conform to the requirements of AWS D1.1 Structural Welding Code – Steel, published by the American Welding Society, except as modified by this section.

9. Welding inspection of cold-formed steel members shall conform to the requirements of AWS D1.3.

10. The welding inspector shall make a systematic record of all welds. This record shall include in addition to other required records:

    a. Identification marks of welders.

    b. List of defective welds.

    c. Manner of correction of defects.

11. The welding inspector shall check the material, equipment, details of construction and procedure, as well as the welds. The inspector shall also check the ability of the welder. The inspector shall verify that the installation procedure for automatic end-welded stud shear connectors is in accordance with the requirements of AWS D1.1, Structural Welding Code – Steel, published by the American Weld Society and the approved plans and specifications. The inspector shall furnish the architect, structural engineer and the enforcement agency with a verified report that the welding is proper and has been done in conformity with AWS D1.1, Structural Welding Code – Steel, published by the American Welding Society and the approved plans and specifications. The inspector shall use all means necessary to determine the quality of the weld. The inspector may use gamma ray, magnaflux, trepanning, sonics or any other aid to visual inspection, which the inspector may deem necessary to be assured of the adequacy of the welding.

12. EXCEPTION: Plant welding inspection of open-web steel joists may be waived with the approval of the enforcement agency where welding inspection is provided at the jobsite.

13. CBC Section 1704A.3.3 Inspection of High Strenth Bolt Installations. Inspection of high-strength bolt installations shall be made by an inspector specially approved for that purpose by the enforcement agency. The inspector shall check the materials, equipment, details of construction and installation procedure. The inspector shall furnish the architect, structural engineer and the enforcement agency with a report that the work has been completed in every material respect in compliance with the approved plans and specifications.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store structural steel above grade on platforms, skids or other supports.

B. Protect steel from corrosion.

C. Store welding electrodes in accordance with AWS D 12.1. Deliver electrodes to the site in unbroken packages bearing the manufacturer's name and label identifying the contents.

D. Store other materials in a weather-tight and dry place until installed into the Work.

1.7 PROJECT SITE CONDITIONS

A. Site Measurements: Take field measurements as required. Report any major discrepancy between Drawings and field dimensions.

B. Protection of Floors: Use caution to protect floor slab and adjacent Work from damage. Do not overload floors. Use rubber tired equipment to handle and move steel. Do not place steel members directly on floor; use pads of timber or like material for cushioning.

C. Temporary Flooring: Provide necessary temporary planking, scaffolding, and flooring for erection of structural steel or support of erection machinery. Conform use of temporary floors or steel decking to Code.

D. Connection of Steel Decking Temporary Flooring: Temporarily weld steel decking to supports where used as a working platform. Distribute concentrated loadings from welding machines and other heavy machinery with planking or equal. Replace decking damaged by use as a working platform at no additional contract cost.

PART 2 - PRODUCTS

2.1 GENERAL

A. Stock Materials: Provide exact materials, sections, shapes, thickness, sizes, weights, and details of construction indicated on Drawings. Changes because of material stock or shop practices will be considered if net area of shape or section is not reduced thereby, if material and structural properties are at least equivalent, and if overall dimensions are not exceeded.

B. All shapes, bars, plates, tubes and pipes shall be made of materials with at least 16% recycled content if produced from Basic Oxygen Furnace (BOF) or at least 67% recycled content if produced from Electric Arc Furnace (EAF).

2.2 MATERIALS

A. Structural Steel: See structural drawings for detailed list of steel shape ASTM designation requirements.

B. Threaded Fasteners: See structural drawings for ASTM designations.

C. High-Strength Threaded Fasteners: See structural drawings for ASTM designations.

D. Anchor Bolts: See structural drawings for ASTM designations.

E. Primer: Use types acceptable to governing air quality management officials.

1. For above-grade locations: Lead free metal primer, Tnemec 10-99 or Rust-Oleum X-60.

2. For below grade applications: Coal-tar epoxy coating, two coats, 5 mils per coat. Perma Bar, as manufactured by Karlee Co., Burbank, CA, or equal. Touch-up on job site with Perma-Bar coal-tar epoxy, match finish coat thickness.

F. Clevis & Turnbuckle materials to be C-1035 and shall have the capacity to resist loads equal to or greater than those specified in the Manual of Steel Construction – Allowable Stress Design, Ninth Edition Tables on 4-148 & 4-149. Supply Structural Engineer of Record evidence of conformance to the specified classifications and capacities.

G. Galvanizing: ASTM A123.

H. Welding Electrodes: Provide electrodes recommended by manufacturer for seismic connections.

1. Comply with AISC 341.

I. Shear stud connectors: ASTM A108, Grade 1015 forged steel, headed, uncoated, granular flux filled shear connector or anchor studs by Nelson Stud Welding Division of TRW, Lorain, OH, or equal.

J. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 7 days; of consistency suitable for application and a 30 minute working time. Grout shall be non-gas-forming, free of oxidizing catalysts and inorganic accelerators, performance and characteristics when mixed to a fluid consistency meeting CRD-C-79 and CRD-C-588, non-staining type in exposed areas.

2.3 FABRICATION

A. Cleaning and Straightening Materials: Materials being fabricated shall be thoroughly cleaned of scale and rust, and straightened before fabrication. Cleaning

and straightening methods shall not damage material. After punching or fabrication of component parts of a member, twists or bends shall be removed before parts are assembled. Produce finished members free from twists, bends, and open joints when erected.

B. Drilling, Punching, and Reaming: Hole burning to make or enlarge previous holes is allowed only with prior approval. Prepare required holes in structural steel members for attachment or passage of Work of other trades. Precisely locate finished holes to ensure passage of all bolts through steel assemblies without drifting. Enlarge holes only by reaming. Poor matching of holes is cause for rejection.

C. Milling: Compression joints depending on contact bearing shall be furnished with bearing surfaces prepared to a common plane by milling.

D. Use of Burning Torch: Oxygen cutting of members shall be performed by machine. Gouges greater than 1/16 inch that remain from cutting shall be removed by grinding. Reentrant corners shall be shaped notch free to a radius of at least 1 inch. Gas cutting of holes for bolts or rivets is not permitted.

E. Galvanizing: After fabrication, items indicated or specified to be galvanized shall be galvanized in largest practical sizes. Fabrication includes operations of shearing, punching, bending, forming, assembling or welding. Galvanized items shall be free from projections, barbs, or icicles resulting from the galvanizing process.

F. Welding:

1. Type of steel furnished in welded structures shall provide chemical properties suitable for welding as determined by chemical analysis. Welds shall conform to the verification and inspection requirements of CBC Chapter 17A. Conform to AWS D1.1, and CBC Chapter 22A.

2. Materials and workmanship shall conform to the requirements specified herein and to CBC requirements, modified as follows:

   a. No welded splices shall be permitted except those indicated on Drawings unless specifically reviewed by the Architect.

   b. Drawings will designate joints in which it is important that welding sequence and technique be controlled to minimize shrinkage stresses and distortion.

3. Welding shall be performed in accordance with requirements of the AWS Structural Welding Code.

   a. Welded Joint Details: Comply with AISC 341, AISC 358 and drawing details.

4. Architecturally Exposed Structural Steel: Verify that weld sizes, fabrication sequence, and equipment used for Architecturally Exposed Structural Steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind

smooth exposed fillet welds ½ inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.

5. Remove erection bolts on welded, Architecturally Exposed Structural Steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Shop Finish:

1. Notify the IOR when Work is ready to receive shop prime coat. Work shall be inspected by the IOR before installation of primer.

2. Structural steel and fittings, except galvanized items, which will be exposed when building is completed, shall receive a coat of primer.

3. The primer specified shall be spray applied, filling joints and corners and covering surfaces with a smooth unbroken film. The minimum dry film thickness of the primer shall be 2.0 mils.

4. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete or high strength bolted.

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

I Fabricate Architecturally Exposed Structural Steel with exposed surfaces smooth, square, and free of surfaces blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.

1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating and shop priming.

2. Comply with fabrication requirements, including tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for Architecturally Exposed Structural Steel.

J. Architecturally Exposed Structural Steel: use special care in unloading, handling and erecting the steel to avoid marking or distorting the steel members. Minimize damage to any shop paint when temporary braces or erection clips are used. Avoid unsightly surfaces upon removal. Grind smooth tack welds and holes filled with weld metal or body solder. Plan and execute all operations in such a manner that the close fit and neat appearance of the structure will not be impaired.

K. Reduced Beam Sections (RBS's): Fabrication of RBS's as defined in AISC 341 and 358.

L. Contact: Pin components parts of built-up members and maintain in close contact using clamps or temporary bolting during welding operations. Accurately mill compression bearing surfaces of joints depending on contact bearings or saw cut square to axis, or as detailed. Cut other joints straight and true.

M. Joining: Provide members of the sizes, weights, shapes, and arrangements indicated, closely fitted and finished true to line and in precise position as necessary to allow proper joining of parts in the field. Drifting to enlarge unfair holes is not allowed without prior approval.

N. Holes For Anchor Bolts: Punch and drill or ream holes in base and bearing plates. Do not make or enlarge the holes by burning except for grouting holes in column bases without prior approval by the Architect.

2.4 CONNECTIONS:

A. Make connections with bolts as noted on the Structural Drawings.

B. High-Strength Steel Bolting: For joints connected by high strength steel bolts, hardened washers, and nuts tightened to high tension, conform materials, method of installation and tension control, and wrenches to Reference Standards and CBC Chapter 22A, Division III. Install all high-strength bolts under inspection required by CBC Section 1704A.3.3.

1. Connections shall be the "bearing bolt type" (A325-N) unless noted to be "slip-critical" (A325-SC and A490-SC). Refer to drawings. All bolts of Seismic Load Resisting System (SLRS) shall be pretensioned meeting the requirements for slip critical fraying surfaces in accordance with AISC 360-05, Section J3.8 with a class 'A' surface per section 7.2 of AISC 341-05.

2. Bolt lengths shall be the grip plus 1-1/4".

3. Tightening of nuts shall be done with properly calibrated wrenches or by the turn-of-the-nut method for A325-SC and A490-SC bolts. Tightening of the nuts for A325-N bolts to snug tightness shall be to Ref. Spec. Allowable bolt stresses shall conform to CBC Chapter 22A and referenced standards.

4. Check calibrated wrenches individually for accuracy not less than once daily for actual conditions of application.

5. Clean all contact surfaces of bolted parts and threads free of scale, slag, burrs, pits, dirt, paint, and other foreign material or defects which would prevent solid seating of connected parts.

6. Install hardened washers per AISC Standards and CBC Chapter 22A.

7. Tighten bolts systematically from most rigid part of connection to the free edges.

8. Retighten first installed bolts that may have loosened by tightening of subsequent bolts so all bolts are tightened to correct tension.

9. Mark fully tightened bolts with identifying symbol.

10. The contractor shall torque test 25% of the bolts in connections designated with A325-SC or A490-SC Bolts.

C. Load Indicator Washers: As manufactured and licensed by Cooper and Turner, Bethlehem Steel, or approved equal, may be used for the field installation of the high-strength bolts. Load indicator washers may not be substituted for any required washer, but may be used in conjunction with the required washers. Conform tightening to Paragraph 5e of the Reference Spec listed under Section

1.2 . After sufficient bolts in a joint are snugged to bring the members into close contact, tightening shall progress from the most rigid part to the free edges until the load indicators on all bolts are closed to the required gap of 0.015" under bolt heads or 0.010" under the nuts. Do not completely close the gap to prevent overtightening and damage to the bolts. Conform to ASTM F959, A325 and A490.

D. Tension Set or Load Indicator Bolts, Nuts, and Washers: As manufactured by Cold Form Specialties, Bethlehem Steel, or approved equal, may be used for field installation of the high-strength bolts. In multi-bolt joints, the nuts shall be tightened in stages (a little at a time) without breaking the spline in any of them until the final stage, to minimize slackening of the installed bolts.

2.5 WELDING:

A. Conform to CBC Section 1704A.3.1.1, AWS D1.1 as modified by referenced AISC Standards, and as indicated or noted on Drawings. Employ welding operators qualified in accordance with AWS D1.1, as applicable, who are thoroughly trained and experienced in arc welding and that produce uniformly reliable groove and fillet welds in flat, vertical, and overhead positions, and make neat and consistent welds. Weld all structural steel joints by shielded electric-arc method unless otherwise shown, specified, or approved. Conform welding in both shop and field, including the prequalification of welds and welder qualifications, to AWS D1.1.

B. Storage and Care of Electrodes: Coatings of low-hydrogen type electrodes shall be thoroughly dry as used. Conform to AWS D1.1; use electrodes as taken from hermetically sealed packages within time limit specified therein after package is opened. Electrodes not used within allowable time period and electrodes that have been exposed more than one hour to air having a relative humidity of 75% or greater, or as required by the manufacturer, shall be dried according to AWS D1.1 before they are used, or shall be reconditioned according to electrode manufacturer's recommendations. Electrodes so dried or reconditioned not used within allowable time period after drying is completed shall be redried before use. Electrodes of any class that have been wet shall not be used under any conditions.

C. Preparation: Clean steel surfaces to be welded of all paint, grease, oil, mill scale, and foreign matter. Clean weld each time the electrode is changed. Chip full surface of hand guided and controlled flame cut edges before welding. Surfaces prepared with automatic or mechanically guided and controlled equipment need not be ground or chipped before welding.

D. Weld Finishing: Grind exposed welds subject to contact to smooth surfaces free of holes, slag, or other defects, flush with the adjoining surfaces. No finish treatment is required for permanently concealed welds and other exposed welds.

E. Procedures: During assembling and welding, hold components of a built-up member with adequate clamps or other means to keep parts straight and in close contact. Do no welding in wind until adequate protective screening is set up. Cut out defective welds or parts of welds with a chisel or air arc and replace.

F. Weld Characteristics: Conform to AWS D1.1, Chapter 8, Statically Loaded Structures. Clean and wire brush all welds. Visual inspection of finished welds must show uniform section, smoothness of welded metal, feather edges without undercuts or overlays, freedom from porosity and inclusions, and good fusion and penetration into base metal at edges and ends of fillet welds.

2.6 SHOP PRIMING

A. Clean surfaces according to AISC Specifications. Apply one shop coat of specified metal primer to minimum 1.0 mil dry film thickness. Work primer into joints. Do not prime the following:

1. Steel surfaces embedded in concrete or masonry with the exception of those steel surfaces that support anchored brick veneer.

2. Contact surfaces of high-strength bolted connections or field welded connections.

3. Surfaces to receive directly adhered fireproofing.

2.7 SHOP AND FIELD QUALITY CONTROL

A. A special inspector, approved by DSA to inspect the Work of this section, shall inspect high-strength bolted connections. The Owner will provide a DSA approved independent testing laboratory to perform tests and prepare test reports in accordance with CBC 1704A.3.3. The IOR shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.

B. An AWS CWI certified special inspector, approved by DSA to inspect the Work of this section, shall inspect welded connections in accordance with CBC 1704A.3.1. The Owner will provide a DSA approved independent testing laboratory to perform tests and prepare test reports. The IOR shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.

C. The independent testing laboratory shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations there from.

D. Provide access to all places where structural steel Work is being fabricated or produced so required inspection and testing can be performed.

E. The independent testing laboratory may inspect and/or test structural steel at plant before shipment; however, Architect reserves the right at any time before Contract Completion to deem materials not in compliance with the specified requirements as defective Work.

F. Correct defects in structural Work when inspections and laboratory test reports indicate noncompliance with specified requirements. Perform additional tests as may be required to reconfirm noncompliance of original Work, and as may be required to show demonstrate compliance of corrected Work.

G. Welding: Inspect and test during fabrication and erection of structural steel assemblies as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the Work. Record Work required and performed to correct deficiencies.

2. Inspect welds. Welds shall be visually inspected before performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. Testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded non-tubular connections.

3. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. Repair and test defective welds.

4. Rate of Testing: Completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.

5. Welds, when installed in column splices, shall be tested by either ultrasonic testing or radiography.

6. Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected by shear wave methods for discontinuities directly behind such welds. Tests shall be performed at least 48 hours after completed joint has cooled down to ambient air temperature.

7. Any material discontinuities shall be reviewed based on the defect rating in accordance with the criteria of AWS D1.1 table 6.3 by the Architect and DSA.

8. Other method of non-destructive testing and inspection, for example, liquid dye penetrate testing, magnetic particle inspection or radiographic inspection may be performed on weld if required.

9. Lamellar Tearing: Lamellar-tearing resulting from welding is a crack (with zero tolerance) and shall be repaired in accordance with AWS D1.1.

10. Lamination: The rejection criteria shall be based on ASTM A435.

11. Where testing reveals lamination or conditions of lamellar tearing in base metal, the steel fabricator shall submit a proposed method of repair for review by the Architect. Test repaired areas as required.

12. Magnetic Particle Testing: Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The standards of acceptance shall be in accordance with AWS D1.1 – Qualification.

H. Lamellar Tearing: Prior to welding plates 1 to 1-1/2 inches thick and greater and rolled shapes within the distance from 6 inches above the top of the joint to 6 inches below the bottom of the joint shall be checked by ultrasonic testing for laminations in base metal which may interfere with the inspection of the completed joint. Should these defects occur, members will be reviewed by the Architect and DSA. Welding procedure specifications in sub-section 1.5G specify welding practices to minimize lamellar tearing.

I. Prior Testing of Base Material: Test material before fabrication.

J. Lines and levels of erected steel shall be certified by a State of California licensed surveyor as set forth in related Division 01 section.

K. Welded studs shall be tested and inspected by the special inspector in accordance with requirements of AWS D1.1 – Stud Welding.

L. Record Drawings: After steel has been erected, correct or revise Shop Drawings and erection diagrams to correspond with reviewed changes performed in the field.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify governing dimensions and conditions of the Work before commencing erection Work.

1. Report discrepancies between drawings and field dimensions to Architect before commencing work.

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

B. Provide temporary shoring and bracing, and other support during performance of the Work. Remove after steel is in place and connected, and after cast-in-place concrete has reached its design strength.

3.2 ERECTION

A. Install structural steel accurately in locations, to elevations indicated, and according to AISC specifications and CBC requirements.

B. Clean surfaces of base plates and bearing plates.

1. Install base and bearing plates for structural members on wedges, shims, or setting nuts as required.

2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims; cut off flush with edge of base or bearing plate before packing with grout.

C. Maintain erection tolerances of structural steel within AISC Code of Standard Practice for Steel Buildings and Bridges.

1. Architecturally Exposed Structural Steel members and components, plumbed, leveled and aligned to a tolerance not to exceed one-half the

amount permitted for structural steel. Contractor to provide adjustable connections between Architecturally Exposed Structural Steel and the structural steel frame or the masonry or concrete supports, in order to provide the erector with means for adjustment.

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

E. Do not permit thermal cutting during erection of structural steel.

F. Where indicated for field connections, provide standard bolts complying with ASTM A307.

G. Install high strength steel bolts at locations indicated. Assembly and installation shall be in accordance with CBC requirements.

1. Allowable hole sizes: 1/16 inch larger than bolt size except as noted.

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

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

4. Tighten bolts by power torque wrench or hand wrench until twist-off.

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

I. Erect structural steel plumb and level and to proper tolerances as set forth in the AISC Manual. Provide temporary bracing, supports or connections required for complete safety of structure until final permanent connections are installed.

J. Steel Columns: Set column bases in exact position for alignment, plumb and straight, supported on adjustable bolt supports or shims until grout has set. Set center of base true to column center within 1/16" and adjust column height exactly. Maintain bases at exact position and level during grouting. Fill grout space solid with non-shrink grout.

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

L. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A780.

M. Connections: Hold steel in correct position during welding and bolting, and provide for dead loads, wind, and all erection stresses. Do no welding or final bolting until members have been aligned and plumbed.

1. Field Welding: Conform to requirements for shop fabrication.

2. Common Bolts: Tighten and upset bolt threads to preclude loosening, or use approved self-locking nuts.

3. High-Strength Bolting: Tighten by turn of the nut method or with calibrated torque wrenches as specified for the shop high-strength bolting and according to Code, AISC Standards and the Reference Standard.

N. Damaged Members: During erection, straighten or replace members which are bent, twisted, or damaged as directed. If heating is required, perform heating by methods that ensure a uniform temperature throughout the entire member. When directed, remove members damaged to an extent impairing appearance, strength, or serviceability and replace with new members at no extra cost to the Owner.

O. Employ qualified riggers and plan erection to require minimum cutting. Erect members plumb, true to line and level, and in precise positions. Provide temporary bracing and guying to resist loads and stresses to which the structure may be subjected, including those due to erection equipment and its operation.

3.3 FITTING

A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.

B. Drilling to enlarge unfair holes will not be allowed. Allow only enough drifting during assembly to bring parts into position, but not enough to enlarge holes or distort the metal. Do not heat rolled sections, unless approved by Architect.

3.4 PUNCHING AND DRILLING

A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.

B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.

C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts by reaming; flame cutting to enlarge holes is not acceptable. Structural Steel members with poorly matched holes will be rejected.

3.5 FINISHING

A. After erection, spots or surfaces where paint has been removed, damaged, or burned off and field rivets, bolts, and other field connections not concealed in the work, shall be cleaned of dirt, oil, grease, and burned paint and furnished with a spot coat of the same primer installed during shop priming.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Install paint to exposed areas with the same material installed during shop painting. Install by brush or spray to provide a minimum dry film thickness of 1.5 mils.

3.6 FIELD QUALITY CONTROL

A. Owner will provide a special inspector and independent testing laboratory to perform field inspections and tests and to prepare test reports.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. All welders shall be qualified for each process and position per the latest edition of AWS D1.1, Chapter 4, Part C - Performance Qualifications. The welder's qualification shall be considered as remaining in effect indefinitely unless the welder is not engaged in a given process of welding for which the welder is qualified for a period exceeding six months or unless there is some specific reason to question a welder's ability.

D. Inspection of Shop Fabrication: Required for structural steel according to CBC Section 1704A.3.2.1.

E. Inspection of Shop and Field Welding: Required for all structural steel according to CBC Section 1704A.3.1.1.

F. Inspection of High Strength Bolt Installation: Required for both shop and field installation according to CBC Section 1704A.3.3 and 2212A.2.

G. Erection Inspection: Inspector shall inspect all erection including the grouting under base plates.

H. Non-Destructive Welding Inspection: The Special Inspector(s) shall continuously inspect and test all welds by ultrasonic or other non-destructive tests as approved. Test procedure for ultrasonic tests shall conform to AWS D1.1 and requirements herein.

1. Required Testing: Test following welds by ultrasonic testing method:

   a. Full Penetration Groove welded connections of column to column, column to girder, girder to girder, and like connections.

   b. Other welded connections indicated to be ultrasonically tested on Structural Drawings.

   c. Other welds directed to be ultrasonically tested by the Architect, Structural Engineer, or Inspector Of Record.

2. Ultrasonic Testing: An AWS Certified Welding Inspector, approved by DSA shall operate ultrasonic testing equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. Defective welds shall be repaired in accordance with AWS D1.1, latest revision, and costs for retesting defective welds shall be responsibility of the Contractor. Tests shall be complete tests according to AWS D1.1, latest revision.

3. Rate of Testing: Test welds requiring ultrasonic testing at 100 percent. No reduction in testing rate will be permitted.

4. Backing Strips: Remove backing strips whenever ultrasonic indications arising from weld roots can be interpreted as either a weld defect or a

backing strip, and retest weld if no root defect is visible. If no defect is disclosed by retest and no significant amount of the base and weld metal is removed, joint needs no further repair or welding. Repair all defects disclosed. Contractor shall bear the cost of removals and repairs.

5. Ultrasonic Instrumentation: Calibrated by technician to evaluate the quality of welds in accordance with AWS D1.1-06, Sections 5 and 6.

6. Acceptance Criteria: In accordance with larger reflector criteria of AWS D1.1, latest revision.

3.7 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project Site.

3.8 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.9 HANDLING

A. Both in shop and in the field, transport, handle and erect to prevent damage or overstressing of any component.

END OF SECTION

SECTION 05 30 00

METAL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Metal decking as indicated.

2. Shear connectors.

3. Bent plate and sheet metal closures at decking edges and openings.

4. Holes through decking, with reinforcing.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection.

2. Section 05 12 00: Structural Steel

3. Section 07 60 00: Flashing and Sheet Metal.

1.2 REFERENCES

A. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

D. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E. AWS D 1.3 – Structural Welding Code Sheet – Steel.

F. AISI – Specifications for the Design of Cold-Formed Steel Structural Members.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Compute properties of deck sections on basis of effective design width as limited by provisions of the AISI specifications. Provide no less than deck section properties specified, including section modulus and moment of inertia per foot of width.

B. Regulatory Requirements:

1. Requirements of Regulatory Agencies: DSA and Underwriters Laboratories Inc. (UL) approval for the decking when installed as a part of an assembly indicated on Drawings in which fire resistive construction ratings are required.

2. Work of this section shall be in accordance with CBC.

1.4 SUBMITTALS

A. Shop Drawings: Submit drawings fully detailing and dimensioning all steel decking including accessories, fastenings, welding, holes with reinforcing, flashings, and closures. Indicate welding according to AWS Standard Welding Symbols. Show dimensioned layouts for openings and reinforcing details.

B. Calculations and Data: If steel decking of type differing from that indicated or specified is proposed, submit the manufacturer's calculations and supporting data showing that proposed decking conforms to requirements indicated and specified. Include the decking manufacturer's technical product data and copies of code approvals (including ICC report) for proposed decking. Submit with shop drawings and obtain approval prior to fabrication and delivery of decking.

1.5 QUALITY ASSURANCE

A. General: Metal decking steel shall conform to requirements of strengths and properties of standards specified.

B. Qualifications of Welders: Properly certified for the type of Work involved in compliance with CBC requirements and AWS D1.3.

C. Continuous inspection of welding will be performed by a special inspector, approved by DSA to inspect the Work of this section. Refer to Section 01420: Testing and Inspection. The IOR shall be responsible for monitoring the work of the special inspector to ensure that the inspection program is satisfactorily completed.

D. Identification of metal decking steel shall conform to the standards specified in Section 01420: Testing and Inspection.

1. Fabricator shall furnish sufficient evidence to the Architect attesting compliance with specified requirements.

2. Conform to CBC requirements. Unclassified or unidentified decking is not permitted. Furnish deck manufacturer's certified mill analyses and test reports for each heat covering decking having a minimum Fy of 33 Ksi. In addition, for decking having Fy greater than 33 Ksi, testing laboratory shall perform one tension and elongation test and one bend or flattening test for each gage.

E. Unidentifiable Steel: Steel which is not readily identifiable as to grade from markings and test records is not permitted to be provided as part of the Work of this section.

F. Metal Decking Shall be in conformance with the following:

1. AISI "Specification for Design of Light Gauge Steel Members".

2. AISI "Specification for Design of Cold Formed Steel Members".

3. Steel Deck Institute Publication No. 29 "Design Manual for Composite Decking, Form Decks and Roof Decks.

G. Payment For Tests and Inspections:

1. Owner shall pay inspection and testing costs of identifiable steel.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Deck West

B. Verco Manufacturing Inc.

C. ASC Steel Deck

D. Members of Steel Deck Institute (SDI).

2.2 MATERIALS

A. Metal Decking: Roll-formed sheets conforming to ASTM A653, Grade 33, minimum yield strength of 38,000 psi, with G90 zinc coating, unless otherwise noted.

1. Section properties shall conform to applicable provisions of latest edition of AISI - Specification for the Design of Cold-Formed Steel Structural Members.

2. Deck lengths to span over at least three spans unless otherwise indicated. Each panel shall be factory slotted or have rolled-in moisture venting provisions.

B. Flexible Closure Strips for Deck: Vulcanized, closed-cell, expanded chloroprene elastomer, complying with ASTM D1056, Grade SCE #41.

1. Brittleness Temperature: Minus 40 degrees F, ASTM D746.

2. Flammability Resistance: Self-extinguishing,

C. Metal Flashing and Closures: 22 gage minimum, with ASTM A653, G90 zinc coating.

D. Shear Connectors: Headed stud type, ASTM A108 Grade 1015, cold-finished carbon steel complying with AISC specifications.

E. Decking Accessories: Provide indicated and required decking accessories including, without limitation, welding washers and welding anchors, closures, transitions, and filler strips, as required for complete installations. Provide bent plate closures, angles, channels, and attachments as required for openings through decking for ducts, shafts, piping, and other penetrations; where decking changes direction; and at decking perimeter; fabricated of 16 gage galvanized steel unless otherwise shown on the Structural Drawings. Provide roof drain and overflow sumps of minimum 14 gage galvanized steel.

F. Galvanizing Repair Paint: Zinc rich paint conforming to Mil Spec MIL-P-21035 (SHIPS)

2.3 FABRICATION

A. Corrugated sheets or sections shall be designed to support required live load between supporting members.

B. Wherever practical, provide decking in lengths to span over three or more supports.

C. Except as detailed otherwise, provide decking with interlocking side laps, 2-1/2 inches minimum end bearing, and 1-1/2 inches minimum side bearing.

D. Welding: Provide materials and methods in accordance with recommendations of steel decking manufacturer and reviewed submittals. Hold decking tight to the supporting elements with screws or other means for proper welding or crimping of the decking edges. Conform to AWS D1.3, CBC Standards, and to the patterns and weld types indicated, with welds free from sharp edges and protrusions. Field coat welds and abraded surfaces at completion with a anodic type galvanizing repair paint. Omit the field paint coating where welds or abrasions are covered by concrete fill or sprayed fireproofing.

PART 3 - EXECUTION

3.1 OPENINGS

A. Cut and reinforce units to provide openings which are located and dimensioned on the structural and mechanical Drawings.

B. Provide openings, as approved by the Architect and DSA, for other Work not indicated on the Drawings.

3.2 INSTALLATION

A. Install metal decking in accordance with decking manufacturers' recommendations, requirements of Drawings, Shop Drawings, and Specifications.

B. Install metal decking on supporting steel framework and adjust to final position before permanently fastening in place.

1. Install each unit to proper bearing on supports.

2. Install units in straight alignment for entire length of run of cells with close registration of cells of one unit with those of abutting unit.

3. Do not splice units except at supports. Conform to code approvals and approved submittals.

C. Fasten decking to steel framework at ends of units and at intermediate supports. Welding shall be as indicated on Drawings.

D. Fasten side laps between supports as indicated on Drawings.

E. Cutting and Fitting: Perform cutting and fitting at columns, perimeters, shafts, stairs, and other openings. Provide tight fitting closures at the open uncovered ends and edges of decking, and all miscellaneous supports required to carry the metal decking. Secure hole reinforcement to decking with fillet welds placed on both sides of reinforcing members. Place reinforcement channels and angles across flutes and to project a distance beyond sides of openings equal to the maximum size of the opening unless otherwise shown. Perform field cutting and trimming square and neat, equal to factory cutting.

F. Welding: Use materials and methods in accordance with recommendations of steel decking manufacturer and approved submittals. Hold decking tight to the supporting elements with screws or other means as directed for proper welding or crimping of the decking edges. Conform to AWS D1.3 and to the patterns and weld types indicated, with all finished welds free of sharp points or edges. Field coat welds and abraded surfaces at completion with an approved anodic type galvanizing repair paint. Omit the field paint coating where welds or abrasions are covered by concrete fill or sprayed fireproofing.

G. Weld shear connectors to supports thru decking units as required by Drawings. Weld only on clean, dry surfaces. Do not weld shear connectors thru two layers of decking units.

H. Damaged Decking: Remove and replace all metal decking showing denting or other damage that adversely affects decking strength or subsequent materials, as directed.

3.3 METAL FLASHINGS AND CLOSURES

A. Furnish, install, and weld in position, sheet metal closure flashing, closure angles, closure plates, profile plates, and shear plates.

B. Close open ends of cell runs at columns, openings, walls, similar interruptions and termination.

3.4 FIELD QUALITY CONTROL

A. Inspection: Install steel decking under continuous inspection according to CBC Chapter 17A, 1704A.3.1.1.

1. Welding inspection for steel deck diaphragms shall conform to CBC Section 2204A.1.

3.5 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.6 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 05 41 00

LOAD-BEARING METAL STUDS

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Load-bearing metal stud systems.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection.
2. Section 05 12 00: Structural Steel.
3. Section 09 22 16: Metal Support Assemblies.

1.2 SUBMITTALS

A. Shop Drawings: Submit drawings showing framing, connection details, accessories and anchorage. Indicate location of assemblies, size and spacing of framing components.

B. Product Data: Submit manufacturer's catalog data for each item proposed for installation.

C. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

D. Weld Procedures: Submit weld procedures, procedure qualification records, and electrode product data for review and approval.

1.3 QUALITY ASSURANCE

A. Comply with following as a minimum requirement:

1. AISI - Specifications for Design of Cold Formed Steel Structural Members.
2. Welds shall be performed by AWS certified welders. Welding shall be performed in accordance with requirements of American Welding Society (AWS) Structural Welding Code-Steel D1.1 and D1.3. Structural welding Code-Sheet Steel.
3. Welding shall be inspected by a special inspector, approved by DSA to inspect Work of this section. The IOR shall be responsible for monitoring work of special inspector to ensure that inspection program is satisfactorily completed.

4. ASTM A 924 – Standard Specification for General Requirements for Steel Sheet Metallic-Coated by Hot-Dip Process
5. ASTM A 1003 – Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
6. ASTM A 1008 – Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability.
7. ASTM C 954 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks) and Bracing or Bridging for Screw Application of Gypsum Panel Products and Plaster Bases.
8. ASTM C 955 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
9. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by Hot Dip Process.
10. ASTM C 1007 – Standard Specification for Installation of Structural (Axial and Transverse) Steel Framing Members and Accessories.
11. ASTM E 488 – Standard Test Methods of Strength Anchors in Concrete and Masonry.
12. ASTM E 1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.

B. Tolerances: Install walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10 foot straightedge for its entire length at any location within a 1/8 inch tolerance. Install horizontal framing level within a tolerance of 1/8 inch in 12 feet in any direction.

1.4 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered in their original unopened packages and stored protected from damage. Do not store material directly on grade. Provide adequate support to prevent bowing of material prior to installation. If it is necessary to store materials outside, stack them off the ground on a platform and fully protected from the weather.

B. Store welding electrodes in accordance with AWS D12.1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide studs, tracks, joists and accessories manufactured by one of following:
   1. Steel Studs Manufacturer's Association; ICC-ES ER4943P

2. California Expanded Metal Products Co.; ICC-ES ER3403-P

B. Special Connection Accessories: Products manufactured by The Steel Network, Inc., or equal.

2.2 MATERIALS

A. Light Gage Metal Framing:

1. Metal framing shall be formed from corrosion resistant-steel conforming to requirements of ASTM A 653, 50 ksi minimum. Galvanize per ASTM A924, Designation G80.
2. Metal framing shall be manufactured in conformance to ASTM C 955.
3. Install metal framing per ASTM C 1007, Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.

B. Gages and properties of studs shall be as indicated on Drawings.

C. Mechanical anchors to concrete and masonry shall be metal cinch at least 3/8 inch in diameter threaded bolt head type. Anchor bolts to be installed in concrete shall be hook type 1/2 inch diameter or more. Unless otherwise indicated.

D. Mechanical anchors to metal framing shall be No. 10 self-tapping and self-drilling wafer-head screws unless noted otherwise.

E. Accessories: Special top tracks, angles, fasteners, and strips of gypsum wallboard, as required for fire rating assembly required at each condition.

F. Mineral Wool: Thermafiber Safing Insulation.

G. Galvanizing Repair Compound: High zinc dust content galvanizing repair paint meeting the requirements of ASTM A 780-00 or hot applied zinc rich material. Provide one of the following available products or another product complying with the referenced standard:

1. American Solder & Flux; Drygalv
2. Kenco Div.; Galvicon
3. Metalloy Products, Co.; Galvalloy

H. Framing Accessories:

1. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi unless noted otherwise on contract documents.
2. Provide accessories noted below, of thickness and configuration indicated on the Drawings. Where not indicated provide accessories manufacturer's standard of thickness and configuration.
   a. Supplementary framing.

b. Bracing, bridging, and solid blocking.

c. Stud kickers, knee braces, and girts.

d. Hole reinforcing plates.

e. Backer plates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.2 INSTALLATION

A. Erect straight, plumb, square, true to lines, levels or elevations indicated, free from excessive twists and bends and braced against racking.

B. Anchor top and bottom runner track to ceiling or roof structure overhead and to floor structure below.

C. Install studs squarely in top and bottom runner track with firm abutment against track webs.

D. Align and plumb studs, and fasten to flanges of both top and bottom runner tracks.

E. Provide 3 studs minimum at corners of stud walls. Locate so as to provide surfaces for attachment of interior and exterior facing materials.

F. Members not indicated to be welded together shall be attached with manufacturer recommended screws with minimum one screw at each flange of stud to top and bottom track. Wire tying of framing members is not permitted.

G. Provide lateral bracing and bridging in accordance with manufacturer's written recommendations or as required by CBC.

H. Intersecting walls and partitions, whether load-bearing or not, shall be connected.

I. Splices in axially loaded studs are not permitted.

J. Splice or butt weld butt joints in runner tracks. No splices are permitted in tracks over lintels, diaphragm sheathing, or diagonal bracing.

K. Weld connections by fillet welds or plug welds in accordance with AWS recommended procedures and practices.

L. Touch up abrasions, burns, and welding, including construction activities of other trades, with primers for primed steel or with galvanizing compound if galvanized. Remove oil, grease, rust, loose scale, loose coatings, weld slag and other deleterious material before touch-up.

M. Studs that frame door openings shall be clipped to floor with 14 gage angle clips. Each clip to have two fasteners into studs and two fasteners into floor.

N. Provide additional joists or blocking adjacent to exterior and interior walls, openings and elsewhere as required to provide support for indicated ceiling construction.

O. Provide an additional joist under parallel partitions where partition length exceeds 1/2 joist span and around floor and roof openings which interrupt one or more spanning members.

P. Conform to rules and practices set forth in ASTM C 1007-00, and with the manufacturer's printed instructions and recommendations, as applicable.

Q. Cut stock neat and square. Cut framing members by sawing or shearing; do not torch cut. Provide members free of kinks and twists. Do not use damaged or distorted materials.

R. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated on contract documents.

S. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Use backing plates per the structural drawings to accommodate fastenings.

T. Use pre-punched openings in the studs wherever possible to run 1½" outside diameter or smaller conduit or plumbing lines horizontally between studs. If penetrations are required in studs reinforce studs per the Steel Stud Manufacturer's Association (SSMA) requirements or refer to contract documents for stud reinforcing details. If reinforcing details are not specifically shown on the contract documents, reinforce stud penetrations per SSMA requirements.

U. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of lath, sheathing, wallboard or other finishing materials.

3.3 CONNECTIONS TO METAL DECKING

A. Provide premolded neoprene filler strips matching flute profile for non-fire-rated walls and partitions covered on one or both sides up to metal decking.

B. Top runner track of fire-rated partitions shall be a minimum of 20 gage, unless noted otherwise, and attached to metal deck with required fasteners at spacing required for fire rating, but in no case over 16 inches on center. Areas above runner shall be friction fit with a minimum depth of 2-1/2 inches of 4 pounds per cubic foot density mineral wool insulation. A minimum of 1/2 inch of firestopping compound shall be installed to each side of mineral wool insulation for a one-hour system, and one inch of firestopping for a 2-hour system. Install required special tracks, angles, fasteners and strips of gypsum wallboard to provide required fire resistance rating.

C. Proprietary fire-rated top tracks shall be installed in accordance with manufacturer's recommendations and fire rating approval requirements.

3.4 QUALITY CONTROL

A. Welding Inspection:

1. Inspection of field welding operations shall be performed by the special inspector. All inspection and testing shall be in compliance with CBC requirements.
2. The special inspector shall inspect material, equipment, procedures, welds, and welder qualifications.

3.5 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.6 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Metal fabrications as indicated or required, including items such as the following:

1. Steel pipe.
2. Square and rectangular steel tubing.
3. Pipe columns.
4. Steel stairs.
5. Handrails and guardrails.
6. Steel thresholds.
7. Steel ladders.
8. Steel Gates.
9. Gratings, frames and covers.
10. Miscellaneous fabrications, as indicated on the Drawings.

C. Related Sections:

1. Section 01 42 00: Testing and Inspection.
2. Section 05 12 00: Structural Steel.
3. Section 08 71 00: Door Hardware.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating provided materials, dimensions, anchoring detail, and details of termination or connection to adjacent construction. Indicate items that are purchased from a manufacturer and items that are shop fabricated. Indicate component parts requiring Project site fabrication or assembly.

B. Product Data: Submit Product Data for manufactured items. Submit Product Data for primers and finishes.

C. Material Samples: Submit Samples of primers and finishes on fabricated items.

D. Installation Instructions: Submit installation instructions for manufactured items.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Design, fabricate, and install miscellaneous metals in accordance with AISC - Design, Fabrication, and Erection of Structural Steel for Buildings.

2. AWS D-1.1 Code - Welding in Building Construction.

3. Inspection of Welding: Refer to Section 01 42 00: Testing and Inspection.

4. Welding: Refer to Section 01 42 00: Testing and Inspection.

B. Coordinate installation of accessory items required for metal fabrications.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store miscellaneous metal items above grade on platforms, skids, or other required supports.

B. Protect from corrosion or damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel Shapes: ASTM A 36.

B. Steel Pipe:

1. Steel pipe for pipe columns, and other structural purposes shall conform to ASTM A 53, Type E or S, Grade B, as required.

2. Steel pipe other than pipe furnished for structural purposes shall conform to ASTM A 53.

C. Square and Rectangular Steel Tubing:

1. Steel tubing for structural purposes shall be carbon steel conforming to ASTM A 500 or ASTM A 36.

2. Steel tubing other than tubing furnished for structural purposes shall be hot or cold rolled carbon steel electric welded tubing.

D. Cast Steel: ASTM A 27, Grade 65-35.

E. Steel Bolts: ASTM A 307, Grade A, with bolt head and nut dimensions conforming to ANSI B 18.2.1.

F. Rolled Steel Plates and Shapes:

1. Shapes and plates shall conform to ASTM A 36, except for plates to be bent or cold-formed.

2. Plates to be bent or cold-formed shall conform to ASTM A 283, Grade C.

G. Chain: Chain shall be 4/0 double loop pattern coil chain.

H. Grout: Non-shrinking type; Por-Rok, or equal.

2.02 FABRICATION

A. General:

1. For fabrication of Work exposed to view, provide only materials smooth and free of blemishes. Remove blemishes by grinding or by welding and grinding, before cleaning, treating, and installation of surface finishes including zinc coatings.

2. Form exposed Work true to line and level with accurate angles, surfaces, and straight sharp edges.

3. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated or specified.

4. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging Work.

5. Form exposed connections with hairline joints, flush and smooth. Provide concealed fasteners wherever possible.

6. Remove loose rust, mill scale, cutting, and punching burrs.

7. Fabricate items in as large sections as practical to minimize assembly at the Project site.

B. Steel Pan Type Stairs:

1. Provide stringers, risers, sub-treads and platforms to profiles indicated. Form each tread pan and riser in one continuous piece to receive finished tread. Weld or bolt risers and treads to carrier angles. Weld or rivet carrier angles to structural steel stringers. Fasten countersunk bolts, or stud weld clips, through pans and platforms to facilitate fastening of welded wire fabric for concrete fill. Provide welded-on clips for support of soffits. Close ends of channel or box stringers.

2. At intermediate landings, provide metal bases formed of stringers. Miter and weld internal and external corners of metal bases.

3. Provide uprights and posts of rectangular or round tubing as indicated. Provide members a special shop straightening to eliminate distortion and to provide straight alignment. Correct bends, distortions, and damage. Fill dents and grind smooth.

4. Provide railings of profile indicated, fastened to stair stringers and wall substrates as indicated or required.

5. Countersink rivets, bolt heads and screws on finished surfaces, or cut flush with surfaces.

6. Fit and securely fasten components together, with exposed tight-fitting joints. Cut, drill, punch and tap as required for installation.

7. Furnish joints as strong and rigid as adjoining sections. Weld continuously along entire line of contact, except where spot welding is indicated.

C. Stair and Balcony Railings:

1. Railings: Handrails and standards shall be fabricated of Grade B standard weight steel pipe or indicated on Drawings. After fabrication, rails shall be galvanized. Standards shall be attached to stringers and face of balcony as detailed.

2. Panels:

   a. Mesh shall be galvanized woven wire mesh with 58% openness McNichols - Chateau 3105.

   b. Frame members shall be as indicated on Drawings. Corners shall be mortised and tenoned and continuously welded together. Panels shall be galvanized. Fasten panels to rails and standards as indicated.

3. Handrail Brackets: Type indicated.

4. Handrails for stairs and ramps shall be 1 ¼" to 1 ½" diameter (1 ½" nominal) and mounted 1 1/12" clear from side walls per CBC Section 1133B.4.2.5 and 1133B.5.5.1.

5. All welded joints and surfaces shall be ground smooth, no sharp or abrasive corners, edges or surfaces. Wall surfaces adjacent to handrail shall be smooth. CBC Section 1133B.4.2.6 and 1133B.5.5.1.

D. Wire Guards, Partitions and Screens: Fabricate frames of hot-rolled steel channels of size indicated, with mortised and tenoned and riveted or welded joints. Fit frames with steel wire fabric with wires of fabric extended through channel frame and clinched. Fabric shall be 1-1/2 inch diamond mesh, 10 gage, except that at towel

cages and window guards mesh shall be 1-1/4 inch diamond mesh, 9 gage. Wire guards in shops shall be installed in galvanized pipe frames as indicated.

1. Hinged panels and doors, where indicated, shall be fitted with galvanized steel butts, welded stops and padlock lugs. Towel cage shall receive hardware as indicated on Drawings or specified in Section 08710: Door Hardware. Frames, fabric, bolts, pipe supports, and other parts and fittings shall be galvanized.

E. Ladder Extensions: Where vertical ladders are installed for access to roof hatches, provide the following:

1. Roof hatch ladders shall be provided with ladder extensions where required by CBC. Ladder extensions shall be Bilco Model 1, "LadderUP Safety Post," or equal, on fixed ladders below roof hatches where indicated. Device shall be manufactured of high strength steel with telescoping tubular section that locks automatically when fully extended. Upward and downward movement shall be controlled by a stainless steel spring balancing mechanism. Finish shall be black enamel. Unit shall be completely assembled with fasteners for securing to the ladder rungs in accordance with the manufacturer's instructions.

F. Miscellaneous Framing and Supports:

1. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of necessary dimensions to receive adjacent Work retained by framing.

2. Except as otherwise indicated, space anchors 2 feet on center, and provide minimum anchor units of 1-1/4 inch x 1/4 inch x 8 inch steel straps.

3. Shelf angles for exterior construction shall be galvanized steel of sizes indicated.

G. Welding:

1. Weld connections unless otherwise indicated.

2. Weld corners and seams continuously and in accordance with requirements of AWS Code. Welds shall be inspected as required in Section 05120: Structural Steel.

3. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

H. Galvanizing:

1. ASTM A 123, ASTM A 153, or ASTM A 386, as applicable, hot dip with 2.0 ounces per square foot on actual surface and 1.8 ounces per square foot minimum on any specimen, and as specified herein.

2. Galvanizing Repair Material: All States Galvanizing Powder, Drygalv by American Solder and Flux, or equal. Hot applied repair material, or anodic zinc- rich galvanizing repair paint conforming to Mil Spec DOD-P-21035.

3. Items to be galvanized shall be hot-dip galvanized in sections as large as possible.

I. Shop Finish:

1. Metal fabrications shall be provided with a coat of primer, except those indicated to be completed with exposed galvanized finish.

2. Primer: Lead-free red metal primer complying with Fed Spec TT-P-86G, Type I, II, or III; zinc molybdate complying with Fed Spec TT-P-645A. Minimum dry film thickness of primer shall be 2.0 mils.

3. Preparation for Primer Painting: Miscellaneous ferrous metal, except items specified galvanized, shall be thoroughly cleaned and prepared for painting, including removal of shipping oils or protective coatings, mill scale, grease, dirt and rust. Prepare in accordance with SSPC recommendations. Deliver to Project site primed or galvanized as indicated, and ready to receive Project site applied finishes.

4. Galvanized Metal Work to receive Paint: Clean oil, grease and other foreign materials from surfaces. Apply vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.

J. Perforated Metal Stair Risers:

1. Perforated metal: 16GA, stainless steel type 304, ½" round on 11/16" staggered, mill finish, 48% openness.
2. McNichols 1812611641

PART 3 - EXECUTION

3.01 INSTALLATION

A. Handrails and Guardrails:

1. Install standards into metal sleeves cast in concrete, and extending into it at least 9 inches. Wedge standards true, plumb, and fastened by packing with grout. Finish grout smooth and flush with adjacent surfaces.

2. Rails contacting a vertical surface shall be fitted with standard pipe rail flanges, secured to concrete or masonry surfaces with 3/8 inch 2-unit cinch anchor bolts and secured to wood frame surfaces with 3/8 inch lag screws, unless otherwise indicated.

3. Railings abutting pipe columns shall be provided with shaped end caps to fit columns welded to rails, and secured to columns with self-tapping machine screws.

B. Steel Thresholds: Fabricate channel or angle thresholds of rolled steel sections of size indicated, galvanized after fabrication. Anchor into concrete with countersunk 2-unit cinch anchor bolts, unless otherwise indicated.

C. Steel Ladders: Provide at locations indicated, fabricated as detailed. Ladders shall be anchored to concrete or masonry with 1/2 inch cinch anchor bolts. Ladders secured to a wood framed wall shall be anchored with 1/2 inch lag screws. Provide provisions for anchoring ladders before lath is applied to plastered walls.

D. Gratings, Frames and Covers:

1. Over areas indicated, provide steel gratings and grating frames as detailed. Frames shall have mitered and welded corners, and be fitted with anchors.

2. Provide steel checkered plate covers and steel frames for sumps, grease traps, and sand traps, and other covers for access where indicated. Frames shall be provided with mitered and welded corners and be fitted with anchors as detailed. Cover shall be perforated. Each section of access cover shall be furnished with steel pull rings and tool operated fastening device. Screws to fasten covers shall be brass.

3.02 ADJUSTING

A. Touch Up Damaged Surfaces:

1. Shop Painted Finishes: Comply with SSPC-PA-1 for touch-up; apply with brush to produce a minimum 2.0 mil dry film thickness.

2 Galvanized Surfaces: Clean field welds, connections and damaged areas. Repair galvanized finishes in accord with ASTM A 780.

3.03 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Architectural woodwork, casework, trim, hardware, countertops, and shelving as indicated on Drawings.

C. Related Sections:

1. Section 08 80 00: Glazing.

2. Section 09 91 00: Painting and Coating.

3. Section 10 11 16: Visual Display Surfaces.

1.02 SECTION DEFINITIONS

A. "Sustainably managed" is defined as "forests that are being managed through a professionally administered forestry management plan in which timber growth equals or exceeds harvesting rates in both quantity and quality, protecting rivers and streams from degradation, minimizing damage to the forest when harvesting and promoting biodiversity".

1.03 SYSTEM DESCRIPTION

A. Design Requirements: Provide wood products from certified sustainably harvested sources.

1.04 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings of casework indicating materials and hardware, details of construction, dimensions, methods of fastening and installation details. Shop Drawings shall bear a WI Certified Compliance Label indicating that Shop Drawings fully meet requirements of WI grade specified. Shop Drawings shall indicate grounds, backing, blocking, sleepers and other items required for installation of casework, which are to be provided and installed as part of the Work.

B. Certificates: Provide WI Certified Compliance Certificate certifying that materials, fabrication and installation will comply with the specified requirements.

C. Material Samples: Submit 2 inch x 3 inch plastic laminate color Samples of manufacturer's entire color range.

D. Closeout Submittals: Provide a WI Certified Compliance Certificate for Installation.

1.05 QUALITY ASSURANCE

A. Comply with WI Manual of Millwork, grades as specified herein.

B. Each elevation of casework shall bear WI Certified Compliance Label indicating that casework fully meets requirements of WI grade specified.

C. Each plastic laminate countertop shall bear WI Certified Compliance Label indicating tops fully meet requirements of WI grade specified.

D. Mock-ups: When required by the Architect, submit a full-scale base cabinet, countertop, and wall-hung cabinet, illustrating joinery and plastic laminate finish. Base cabinet shall incorporate a drawer, an adjustable shelf, and a door. Wall-hung cabinet shall incorporate 2 doors, one adjustable shelf and finished end, including required hardware.

1.06 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the Project site in undamaged condition, stored in fully covered, well ventilated areas, and protected from extreme changes in humidity and temperature. Refer to WI Manual for recommended care and storage.

B. In event of damage immediately furnish necessary repairs or replacements.

1.07 PROJECT CONDITIONS

A. Store indoors, in ventilated areas with constant but minimum temperature of 60 degrees F. and maximum relative humidity of 25 percent to 55 percent. At least seven days before installation, maintain temperature of 70 degrees F. and relative humidity of 50 percent to 55 percent. Acclimate materials to the installation temperature and humidity for at least 72 hours prior to installation. Maintain conditions until Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plastic Laminate Faced Cabinets:

1. Plastic laminate: High pressure plastic laminate conforming to NEMA standard LD-3; 0.050 inches at horizontal surfaces, 0.028 inches at exposed vertical surfaces and edge bands, and 0.042 inch minimum for post-formed countertops.

2. Particle Board Core Material: 45 lb. density, conforming to ANSI A208.1, Table 1, Grade 1-M-2.

3. Solid Lumber:

   a. Solid lumber for exposed members, drawers, trays and special details shall be Clear birch or maple.

   b. Unexposed solid lumber for concealed webs or structural members shall be of Clear Douglas fir.

4. Softwood Plywood: Rotary cut exterior type A-C grade softwood plywood complying with PS1.

5. Hardboard: Factory finished pressure sealed hardboard conforming to the requirements of PS 58. Oil tempered hardboard shall conform to CS 251.

6. Cabinet Liner: Semi-exposed surfaces shall be finished with 0.020 inch high-pressure laminate cabinet liner, conforming to NEMA Standard LD-3.

7. Edge Banding:

   a. T-type extruded tenite-butyrate 1/16 inch minimum thickness, with serrated leg 3/8 inch in length.

   b. 0.028 inch minimum thickness plastic laminate.

8. Glass Doors: 1/4 inch laminated safety glass.

9. Adhesive: Type II water-resistant, rigid type glue of formula conforming to PS 51.

10. Sealer: Thompson Water Seal 101 or Watco Oil.

11. The Owner will supply tote trays unless otherwise indicated.

12. Base: Cover toe spaces with typical wall base unless otherwise indicated.

B. Wood Casework:

1. Particle Board: 45 lb. density, conforming to ANSI A-208.1, table 1, Grade 1-M-2.

2. Solid Lumber:

a. Concealed portions: Any species of sound, dry, solid stock.

b. Semi-exposed portions: Custom Grade hardwood veneer of the same species as exposed material with a specific gravity in excess of 0.37.

c. Exposed portions: Premium Grade well matched for color and grain, select white birch veneer.

3. Hardboard: Factory finished, pressure sealed hardboard conforming to requirements of PS 58.

4. Edge Banding: Same species of wood as adjacent to exposed surfaces.

C. Hardware:

1. Drawer Slides for Custom Grade Cabinetry:

a. Pencil drawers: Partial extension type: Accuride 2006.

b. Drawers and box drawers, up to 24 inches wide: Accuride 3832A.

c. Lateral file drawers, up to 30 inches wide: Accuride 4034 overtravel or 4033 equal travel.

d. Lateral file drawers, more than 30 inches wide: Accuride 3640.

2. Drawer Slides for Premium Grade Cabinetry:

a. Pencil drawers: Full extension type: Accuride 2632.

b. Drawers and box drawers, up to 24 inches wide: Accuride 7432.

c. Lateral file drawers, up to 30 inches wide: Accuride 4034 overetravel or 4033 equal travel.

d. Lateral file drawers, more than 30 inches wide: Accuride 4437.

3. Flipper Door Slides for Premium and Custom Grade Cabinetry:

   a. For vertically mounted retracting cabinet doors up to 75 lbs. and 72 inches tall: Accuride 1432 with hinge carrier strip.

4. Mutes: Rubber, approximately 1/4 inch diameter, colors to match adjacent finish.

5. Plastic Grommets: Doug Mockett, or equal; color as selected by Architect.

6. Adjustable Shelves with Clips: Adjustable shelf supports (EDP type, unless otherwise noted) set in 5 mm holes spaced 32 mm on center:

   a. Hafele America, Co., No. 282.04.711.

   b. Hafele America, Co., No. 282.24.13.

7. Cabinet Hinges: Concealed type, minimum 170 degree opening, self-closing:

   a. Hafele America, Co., No. 326.05.

   b. Julius Blum, Inc., No. B71650.

   c. Mepla, No. MD61-253-Z00.

8. Cabinet Locks:

   a. Door Locks: Pin tumbler type – National No. 3713 x 2475-172 strike or Olympus 100DR x 12-1 strike.

   b. Locks for Sliding Doors: National No. C8142 x thimble strike or Olympus 300 SD x thimble strike.

   c. Drawer Locks: National 68-3718 x 68-2480C brass strike or Olympus 200 DW x 12-1 strike.

   d. Cabinet locks shall be flush with surface of door and protrude no greater than 3/16".

9. Top-hung Hardware Assembly for Sliding Doors: Grant No. 6064.

10. Track for Sliding Doors: K & V 455 x or 455.55.

11. Pull Flush Ring at Drawers behind Doors: Safe No. 6116 or BBW 24.

12. Pulls: BBW No. 79P, Quality No. 179 x 180 or Trimco No. 553P. Pulls shall be U-shaped wire pulls or equally accessible pull hardware at all accessible casework per CBC Section 1125B.4

13. Catches: Magnetic type - Epco No. 592 or Lawrence No. SC1364-AL.

14. Four-way Tension Catch: Glynn-Johnson GJ21A.

15. Noiseless Catch: Hardware Specialties 11687-FW7.

16. Elbow Catch: Ives 2A.

17. Bolts: Surface type BBW No. 97-B6, Quality B6 or Trimco No. 4856-6.

18. Brackets and Shelf Strip for Glass Shelves: K & V No. 80 x 180 or Garcy 604 x 686.

19. Shelf Standards and Brackets: K & V No. 255 x 256 or line bored holes for pins as approved by WI standards Stanley No. 798 x 799, steel zinc plated.

20. Card Holders for Drawers: Corbin No. 1913-1/4H or Garcy No. 853.

21. Hanger Rods: 1-1/16 inches minimum diameter metal tubing, aluminum or stainless steel clad, KV660; heavy wall steel tubing KV770.

22. Hanger Rod Flanges: KV757, or flanges KV734, KV735; Ronther Reiss R44-55; or equal.

23. Hardware Finish: With exception of finish hardware items which have finishes specified, hardware shall be furnished with dull chrome US 26D or dull stainless steel US 32D finish.

24. TV Pullout Extension and Swivel: Accuride Model CB360-258TV, or equal.

25. Keying:

    a. Key locks inside one room alike. Furnish 3 keys for each lock keyed separately, and 2 keys for each lock in keyed alike groups. Master keys shall be tagged and delivered to the IOR. Locks and keys shall be stamped with coded set number / direct digit.

    b. Cabinet locks shall be master-keyed and keyed alike. Backside of cabinet lock bolts (on visible side following installation) and change keys shall be stamped with manufacturer's code, either

direct digit or coded series. Change keys shall also be stamped with set numbers direct digit.

c. Master keys shall be National GM2

2.02 FABRICATION

A. Plastic Laminated Casework: Construction of plastic laminated casework shall conform to the material and construction requirements for WI Custom grade flush overlay construction.

1. Exposed Vertical Panels and Doors: Exposed fixed panels and doors, including exposed ends of cabinets and both ends of each cabinet shall be 3 ply laminate construction consisting of plastic laminate with particle board and a balancing sheet, bonded together under pressure with adhesive. Total nominal thickness of panels and doors shall be 0.75 inch unless otherwise indicated.

2. Exposed bottom of wall-hung cabinets shall be furnished with plastic laminate finish.

3. Semi-exposed Panels: Interior panels, bottoms, and tops shall be 3/4 inch particleboard minimum. Bottoms of upper cabinets spanning 42 inches or more shall be one inch thick.

4. Webs: Stiles, rails and muntins of web frame shall be tongue and grooved at joints and glued. Top and bottom rails shall be continuous. Use of 8 mm wooden dowels, screws or biscuits shall be in accordance with WI Standards.

5. Cabinet bases may be integral or separate. Bases shall be 3/4 inch thick plywood securely jointed at 4 corners to a supporting block 1-1/2 inches thick.

6. Ends: Cabinet ends shall be minimum 3/4 inch thick, lock-jointed, doweled, glued, and screwed to webs or top and bottom of the cabinet.

7. Backs shall be 1/4 inch thick plywood or 1/4 inch thick particle board, and shall be plowed into sides and top (except countertops) glued and nailed on 4 inch centers. Back shall be braced with horizontal 3/4 inch x 3-1/2 inch backing strips on 3 feet centers maximum. Cabinets with exposed finish backs shall have 3/4 inch backs of laminate construction. Where exposed finished cabinet end and back form an external corner, plastic laminates shall meet at corner.

8. Adjustable shelving shall be 3/4 inch thickness particleboard for spans up to 25 inches and one inch thickness for spans over 25 inches up to 34 inches. Adjustable shelving over 34 inches in span shall be one inch thick plywood core with 0.020 inch cabinet liner both sides. Shelving hardware shall be adjustable to one inch centers. Faces and edges of shelving shall be finished with 0.020 inch thickness cabinet liner both sides.

9. Drawers:

   a. Sides, backs, and sub-fronts of drawers shall be of dovetail or dowel construction and made of 1/2 inch thick clear birch or maple solid stock. Drawer bottoms shall be in accordance with WI requirements, glue blocked and nailed.

   b. Drawers shall be fitted with ball bearing slides accurately installed for smooth drawer operation.

   c. Drawer fronts shall be of 3/4 inch thick plastic laminate construction, fully edge-banded with plastic laminate T-banding to be used when matching existing. T-banding joint shall occur at center of bottom edge of panel.

10. Doors:

   a. Doors shall be of overlay type with flush exposed surfaces. Doors shall be fully edge-banded with plastic laminate. Joint in banding shall occur at center of bottom edge. Doors of cabinets within any group of adjacent units shall be in alignment.

   b. Hinges shall be routed into edge of door. Doors over 40 inches in height shall have 3 hinges.

11. Back Priming: Seal unfinished materials installed for backs, bases, self-edge backing, stripping and other concealed portions with a water-repellent sealer.

12. Banding:

   a. Exposed edges of interior and exterior laminates shall be edge banded with plastic laminate. Edge banding shall be provided in longest available lengths.

b. Edge banding shall be accurately fitted. Where edge band joins plastic surfaces, there shall be no open spaces, voids, or chipping of plastic laminate surface.

c. Exposed cabinet surfaces shall be flush, and any protruding edges of banding shall be machined or trimmed to provide a flat smooth corner at intersection of banding and adjoining surfaces. Plastic laminate edge banding shall be installed on tops, webs, bottoms, ends, and inside partitions. T banding may only be installed on drawer fronts and door edges and only as required to match existing.

B. Wood Casework: Manufacture in accordance with WI Manual of Millwork, Premium Grade, except, modified as follows:

1. Casework bodies shall be 3/4 inch thick particleboard core. Particleboard core shall have a minimum density of 45 pounds.

2. Exposed surfaces for transparent finish shall be plain sliced select white birch, and shall be Premium Grade veneers and solid stock.

3. Semi-exposed surfaces shall be natural birch Good Grade veneer. Semi-exposed portions behind glass or in open cases shall be of same species and grade as exposed portions.

4. Edge banding shall be wood edge bands of same species as adjacent exposed faces.

5. Cabinet doors shall be particleboard core a minimum of 3/4 inch thickness, unless otherwise noted. Interior faces of cabinet doors shall be same species and grade as exposed surfaces. Cabinet doors shall be flush overlay type No. 1.

C. Countertops:

1. Plastic Laminate Tops: Each plastic laminate countertop shall bear the WI Certified Compliance Label.

a. Laminated plastic countertops shall be self-edged, except that plastic countertops containing sink cutouts shall have a no-drip tilt-front edge. Edge shall rise 1/8 inch above counter surface and back and return splashes shall be 6 inches high measured from exposed countertop surface, unless otherwise indicated.

b. Cove and roll front sticking, for plastic laminate back-up, shall be kiln dried clear sugar pine glued to core material. Cove sticking

shall be secured in each direction with 2-1/2 inch long wood screws, 3 inches from each end and 10 inches on center.

c. Splash shall be end applied and be set in mastic and secured to top with screws 8 inches on centers. Splash edges shall be self-edged and scribed to wall.

d. Joints shall be splined and fastened with screw clip fasteners on at least 8 inch centers. Water resisting mastic or glue shall be applied in joints. Joints shall not occur at sink cutouts. Sink cutouts shall be sealed.

e. Core material for counters and splashes shall be 3/4 inch thick, 7-ply, rotary cut Philippine mahogany 2-4 faces, type 1, or 3/4 inch 1-M-2 grade particleboard.

f. Metal sink moldings shall be stainless steel, Hudee, Kintrim T-Type or Chromedge Sink-Lok, with bolts and lugs.

g. Mastic: Metal trim shall have a continuous layer of mastic in voids between metal and plywood and sink. Counter cutout edge shall be waterproofed to prevent delamination of countertop. Metal trim shall be applied over finished plastic surfaces without kerfing or routing of molding.

h. Installation of plastic laminate shall be in accordance with published specifications and recommended practices of the plastic laminate manufacturer.

2. Hardwood Countertops:

a. Hardwood counters shall be fabricated of Number One Clear birch or maple boards from 6 inches to 10 inches wide, of thickness indicated, tongued and grooved, and glued together with waterproof glue, reinforced with cleats or other method to prevent warping or opening of joints. Top surfaces where indicated shall be shaped to drain towards sink, with slope of 1/4 inch.

b. Back, ends and caps shall be 3/4 inch thick, with wide sections constructed same as top without reinforcing strips. Joints between top, back, and vertical corners of back where indicated, shall be fabricated of tongue and groove cove members and glued. Sinks, where indicated, shall be set flush with bottom of drainboards and caulked continuously.

3. Tempered Hardboard Tops: Countertops, backs and ends where indicated hardboard shall be covered with 1/8 inch thick tempered hardboard, installed on both sides of 1/2 inch softwood plywood core. Material shall be installed under pressure with waterproof cement of type recommended by hardboard manufacturer.

D. TV Extension Shelf:

1. Install according to manufacturer's installation instructions.

2. Provide Plastic Laminate covered platform (shelf) to be affixed to swivel plate of TV extension shelf hardware. Platform to be fabricated with the minimum necessary clearance between cabinet sidewalls and the swivel mounting plate to avoid interference during rotation.

2.03 FINISHING

A. Exposed hardwood parts shall be finished with one coat of lacquer sealer and 2 coats of finish lacquer. Unexposed materials such as backs, webs, back of tops, and the like, shall be sealed with one oil base prime coat. Semi-exposed wood surfaces such as drawer interiors shall be finished with one coat of sanding sealer and one coat of clear gloss lacquer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install Work of this section as specified in the WI Manual of Millwork.

B. Cabinets: Install cabinets level, plumb, and secure to walls. Exposed screws shall have finish washers.

C. End Panels and Fillers: Furnish to match exposed surfaces and accurately scribe to walls and neatly and securely fit to cabinets.

D. Completion: Upon completion of installation, cabinets including drawers and shelves shall be cleaned. Doors and drawers shall operate easily and freely.

E. Scribe plastic laminated cabinets to walls. Installation of surface-applied moldings is not permitted.

3.02 CLEAN UP

A. Remove debris, rubbish and waste material and legally dispose of off the Project site.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 07 13 00

SHEET WATERPROOFING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Sheet waterproofing in locations indicated including:

1. Sheet waterproofing on vertical walls below grade enclosing occupied spaces.

2. Sheet waterproofing in planters.

3. Drainage sheets and protection boards.

4. Strip waterproofing at sills, under roof edges, valleys, eaves, ridges and other flashings as indicated.

5. High-temperature resistant sheet underlayment on rigid insulation under metal roofing.

6. Monolithic Membrane Waterproofing (Fabric Reinforced) application for all substrates other than concrete.

C. Related Sections:

1. Section 03 30 00: Cast-In-Place Concrete.

2. Section 04 82 00: Concrete Unit Masonry.

1.02 SUBMITTALS

A. Manufacturer's Qualifications: Provide a list of projects of similar design and complexity completed within the past 5 years.

B. Installer's Qualifications: Submit a certificate, prepared by the waterproofing system manufacturer, stating waterproofing applicator is certified by the waterproofing material manufacturer and, upon completion, submit a certificate stating that waterproofing systems have been installed in conformance with reviewed submittals and manufacturer's recommendations.

C. Product Data: Submit manufacturer's Product Data including installation instructions.

D. Shop Drawings: Submit Shop Drawings indicating each condition of the Work. Indicate all adjoining Work, and indicate methods of adhesion and attachment, laps, and related conditions.

E. Samples: Submit Samples, not less than 12 inches square, of each type of composite sheet membrane, mounted on plywood. Submit 12 inch square Samples of each type of drainage and protection board.

1.03 QUALITY ASSURANCE

A. References:

1. ASTM E 96 - Water Vapor Transmission of Materials; Method B.

2. ASTM E 154 - Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.

B. Qualifications of Manufacturer: Sheet membrane waterproofing system shall be manufactured by a firm with a minimum of 20 years experience in the production of self-adhesive sheet membrane waterproofing.

C. Qualifications of Installer: A firm which has at least 3 years experience in work of the type required by this section, and is recommended by manufacturer to install the specified products.

D. Pre-Installation Conference and Inspection: After review of submittals but before starting installation of the Work of this section, conduct a meeting at the Project site attended by the IOR, Architect, OAR, Contractor waterproofing applicator and a technical representative of the waterproofing material manufacturer. The waterproofing applicator and material manufacturer's technical representative shall inspect the substrates to receive Work of this section and report defective conditions to IOR, Architect, OAR and Contractor.

E. Manufacturer's Representative: Provide arrangements necessary to have a trained representative of the manufacturer visit the Project site on a weekly basis during membrane waterproofing Work to review installation procedures.

F. Materials shall comply with current State of California and local Air Quality Management District requirements for volatile organic compounds.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unopened containers or packages with manufacturer's labels intact.

B. Store materials at the Project site under cover and maintain in dry condition. Protect from damage from excessive temperature and construction operations. Do not double-stack pallets of membrane. Protect mastic and adhesive from moisture and excessive heat. Store drainage composite or protection board flat and above grade. Provide cover on top and all sides of pallets and provide for adequate ventilation. Protect surface conditioner from freezing.

1.05 PROJECT CONDITIONS

A. Apply sheet waterproofing materials only in dry weather and when outside temperature is above 40 degrees F and below 90 degrees F

B. Do not apply sheet waterproofing materials to damp or wet surfaces unless specifically approved in writing by manufacturer.

1.06 WARRANTY

A. Manufacturer shall provide a 5 year material warranty.

B. Installer shall provide a 5 year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Sheet waterproofing shall be as manufactured by W.R. Grace & Co., W.R. Meadows, Inc., or equal.

B. Fabric Reinforced Monolithic Membrane shall be as manufactured by American Hydrotech, Inc., or equal.

2.02 MATERIALS

A. Sheet waterproofing material shall be self-adhesive, cold-applied such as W.R. Grace Bituthene 4000, W.R. Meadows Mel-Rol, or equal. The material shall be a self-adhesive, cold-applied composite sheet consisting of a thickness of 0.056 inches of rubberized asphalt and 0.004 inches of cross-laminated, high density polyethylene film specially formulated for use with water-based surface conditioner. Provide rubberized asphalt membrane covered with a release sheet, which is removed during installation. No special adhesive or heat shall be required to form laps.

B. Surface conditioner: W.R Grace Bituthene 4000, W.R. Meadows Mel-Rol, or equal, latex based surface conditioner.

C. Adhesives fillets and sealers: Types as recommended by manufacturer for installation with specified membrane sheet.

D. Prefabricated Drainage Sheet:

1. For vertical surfaces: Hydroduct 2, Mel-Drain 5035B, or equal, consisting of a dimpled high impact polystyrene core and a needle punched non-woven filter fabric adhered to one side of the core. A film shall be adhered to the other side of the core.

2. For horizontal surfaces: Hydroduct HSF, Mel-Drain 7555, or equal, consisting of dimpled high impact polystyrene core and an extra heavy woven filter fabric bonded to the core.

E. Protection board for horizontal surfaces shall be 1/8 inch thick asphalt-impregnated hardboard; APOC, W.R. Meadows PC-2, or equal. Protection board for vertical surfaces shall be 1 inch thick expanded polystyrene.

F. Strip waterproofing sheet for all sills, doors/windows, wall parapets, under roof edges, valleys, eaves, ridges, and under copings and flashings:

1. High temperature resistant sheet underlayment: W.R. Grace "Ultra", GAF StormGuard HT Leak Barrier, or equal, self-adhesive roofing underlayment designed for use in high temperature applications, consisting of a thickness of 0.076 inches of butyl rubber based adhesive and 0.004 inches of cross-laminated, high density polyethylene and backed by a protective plastic release liner.

G. Fabric Reinforced Monolithic Membrane 6125 system with two layers rubberized asphalt membrane with spunbound polyester fabric reinforcing sheet between.

PART 3 - EXECUTION

3.01 PRELIMINARY WORK

A. Inspect and verify condition of substrates and related Work, in the presence of the manufacturer's technical representative. Do not start installation of membranes until defects in substrates have been corrected. Concrete shall be smooth, dry, and free of voids. Masonry shall have a parge coat applied. Wood decks shall be clean, dry, and free from projecting nails, splinters, and foreign materials.

3.02 APPLICATION OF MEMBRANE ON VERTICAL WALLS BELOW GRADE ENCLOSING OCCUPIED SPACES AND IN PLANTERS

A. Surface Conditioning: Install surface conditioner and allow to dry to surfaces to be covered with membrane the same day.

B. Corner Treatment: Pretreat inside corners with liquid membrane compound, to form a fillet or use formed reinforcement fillet recommended by manufacturer. Smooth all surfaces of outside corners.

C. Horizontal Surfaces: Install 9 inch wide strips of membrane material over construction joints, cracks, and grouted joints. Seal expansion joints as recommended by manufacturer. At drains and vertical projections, install two layers of membrane sheet extended out not less than 6 inches in all directions, and seal. At drains, extend the membrane into the clamping ring and seal. Over prepared surfaces install membrane in one layer and roll into place. Lap sheets 2-1/2 inches at edges and ends.

D. Vertical Surfaces: Install membrane vertically in heights to 8 feet. Lap seams 2-1/2 inches. Roll membrane with hand roller. Extend membrane over top of foundation walls, planter walls and parapet walls, except where reglets are provided for termination.

3.03 PREFABRICATED DRAINAGE SHEET

A. Vertical Surfaces: Install rolls of vertical drainage sheet over the completed membrane, starting at the base of the wall. Peel the fabric back approximately 12 inches from the lower edge. Where drainage pipe occurs, install the drain core behind the pipe and extend the fabric over the outside of the pipe. Adhere the drainage sheet to the wall using strips of adhesive as recommended by manufacturer.

B. Horizontal Surfaces: Adhere the drainage sheet to the membrane with strips of adhesive. Butt adjacent panels together and overlap fabric onto the previous panel. At corners, cut the core and cover the core with filter fabric or tape.

3.04 COMPOSITE STRIP WATERPROOFING

A. Provide at sills, copings, eaves, ridges, and under other flashing as indicated. Do not fold over exposed edges. Prime concrete and masonry surfaces as recommended by manufacturer. Cut the membrane into 10 to 15 foot lengths and reverse roll. Separate membrane from release paper, press firmly into place, and roll to eliminate bubbles and assure full adhesion. Lap sides of sheets not less than 3.5 inches and ends not less than 6 inches.

3.05 HIGH TEMPERATURE RESISTANT UNDERLAYMENT

A. Seal joints in insulation as recommended by manufacturer. Prime insulation at rate of one gallon per 500 square feet if recommended by manufacturer. Over prepared surfaces install membrane in one layer and roll into place. Lap sheets 3-1/2 inches at edges and 6 inches at ends. Roll firmly into place to obtain full adhesion of sheets to substrate.

3.06 APPLICATION OF MONOLITHIC MEMBRANE FOR ALL SUBSTRATES OTHER THAN CONCRETE

A. Membrane Application

1. Install the rubberized asphalt membrane at a rate to provide a continuous, monolithic coat of 90 mil (approximately 2.3 mm), into which is fully embedded a layer of spunbound polyester fabric reinforcing sheet, followed by another continuous monolithic coat of membrane at a minimum thickness of 125 mil or approximately 3.2 mm. Total membrane thickness to be provided is 215 mils or approximately 5.5 mm.

2. Overlap fabric reinforcing sheet 1 to 2 inches (25.4 – 50.8 mm) with membrane between sheets.

3.07 PROTECTION BOARD

A. Cover all surfaces, vertical and horizontal, with protection board, unless indicated otherwise. Install with adhesive recommended by manufacturer, and compatible with membrane materials.

3.08 TESTS OF MEMBRANES

A. All horizontal membranes shall be subjected to standing water test after completion, but before protection board is applied. Tests shall be conducted as soon as possible after completion of membrane in each area. When membrane installation is completed, seal drain, sandbag perimeter, fill membrane with water to height of not less than 2 inches, pond test for not less than 24 hours, repair all leaks or defects disclosed, and test until results are satisfactory. Remove all sandbags, plugs and drain when testing is completed. Clean surfaces of membrane.

3.09 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.10 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 18 00

TRAFFIC COATINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Elastomeric polyurethane waterproof deck coating for pedestrian and vehicular traffic, as indicated on the drawings.

C. Related Sections:

1. Section 03 30 00: Cast-In-Place Concrete.

3. Section 07 60 00: Flashing and Sheet Metal.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Liquid materials shall be non-combustible and shall not emit solvents, or other recognized pollutants, into the atmosphere.

B. Regulatory Requirements: The deck coating system shall be certified by Underwriter's Laboratories (UL) approved Class A designation for fireproof construction.

1.03 SUBMITTALS

A. Shop Drawings: Submit details of installation and terminations.

B. Product Data:

1. Submit manufacturer's product literature.

2. Submit laboratory test reports indicating conformance with this section.

C. Material Samples: Submit Samples for each color selected of elastomeric deck coating, approximately 2 inches x 3 inches in size, installed to a suitable backing material.

D. Certificates: Submit a certificate stating applicator is approved by the manufacturer, and upon completion, submit a certificate stating that elastomeric deck coating has been installed in conformance with reviewed submittals and manufacturer's recommendations.

E. Installation Instructions: Submit manufacturer's installation procedures.

F. Closeout Submittals: Submit manufacturer's printed maintenance and repair instructions.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Elastomeric deck coating shall be product of a manufacturer who has been regularly engaged in the manufacture of this product for at least 10 years. Manufacturer shall supply references of at least 5 satisfactory installations in which deck coating has been in service for at least 5 years.

2. Qualifications of Installer: Installer shall have at least 5 years experience in work of the type required by this section, and is approved by manufacturer to install the specified products.

B. Binders and other liquid and dry components shall be completely mixed and packaged at factory.

C. Pre-Installation Conference and Inspection: After review of submittals but before starting installation of the Work of this section, conduct a meeting at the Project site attended by the IOR, Architect, OAR, Contractor, waterproofing applicator, and a technical representative of the elastomeric waterproofing material manufacturer. The waterproofing applicator and material manufacturer's technical representative shall inspect the substrates to receive Work of this section and report defective conditions to IOR, Architect, OAR and Contractor.

D. Manufacturer's Representative: Provide arrangements necessary to have a trained representative of the manufacturer visit the Project site on a weekly basis during elastomeric waterproofing Work to review installation procedures.

E. Materials shall comply with current State of California and local Air Quality Management District requirements for volatile organic compounds.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project site in manufacturers unopened containers bearing manufacturer's labels.

1.06 PROJECT CONDITIONS

A. Weather Conditions: Do not apply work of this Section if temperature of surfaces to receive coating or ambient temperature are below 40 degrees F or above 90 degrees F. Do not install materials when water or dampness in any form is present on the substrate, if materials are wet, or if rain is imminent.

B. Install suitable impervious type masking to preclude staining of surfaces to remain exposed wherever elastomeric waterproofing abuts or laps on to other finish surfaces, and provide additional protection as necessary to supplement masking; cover entire area of building subject to damage or staining.

C. Protect adjacent Work during installation of Work of this Section.

1.07 WARRANTY

A. Manufacturer shall provide a 5 year material warranty.

B. Installer shall provide a 5 year labor warranty.

PART 2 - PRODUCT

2.01 SYSTEMS

A. Elastomeric polyurethane waterproofing system, heavy-duty vehicle traffic deck:

1. Polycoat Products, Poly-I-Gard 246SF.

2. Gaco Western, GW-15-U62.

2.02 MATERIALS

A. Coating: Liquid applied, moisture-cured, polyurethane deck covering system consisting of the following:

1. Primer: Two component epoxy primer. Minimum dry film thickness of 3 mils.

2. Base Coat: One-part self-leveling, polyurethane. Minimum dry film thickness of 16 mils.

3. Intermediate Coat: One-part self-leveling, polyurethane 16 mils thick minimum.

4. Top Coat: One-part moisture-cured polyurethane coating of 14 mils thick minimum.

5. Total Minimum Thickness: 49 mils.

6. Ramps and Turn Radius: In addition to coatingS indicated above, vehicular ramps and parking turn radii shall receive an additional base coat with a minimum dry film thickness of 14 mils.

B. Aggregate: Crushed walnut shells, 90 Rockwell scale. Size, 12/20 for vehicular applications and 18/40 for pedestrian.

C. Sealant: One-part self-leveling or gun grade, non-staining, polyurethane sealant.

D. Sheet Flashing: Flexible flashing as recommended by coating manufacturer.

E. Backing Rod: Closed-cell polyethylene foam rod.

F. Provide any additional materials and accessories required to provide a complete system as indicated on the Drawings and as recommended by the manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all other work done in this area under other sections has been completed and accepted by the Architect and the Contractor and meet the manufacturer's requirements prior to starting the coating application.

B. Do not begin work until concrete substrate has cured 28 days, minimum.

C. Verify that substrate is free of ridges, sharp projections and damages.

3.02 PREPARATION

A. Surface shall be prepared in accordance with manufacturer recommendation. Clean,and sweep free of loose particles and debris, which might prevent proper installation of the surfacing materials, and remove oil and grease.

B. Concrete Substrate:

1. Prepare concrete surface by sandblasting, shot blasting or acid etching with a 10% to 15% solution of muriatic acid. Flush acid with clean water and allow substrate to dry.

2. Grind smooth fins and projections. Fill depressions with concrete patching compounds recommended by manufacturer.

3. Visible hairline cracks and cold joints shall be cleaned and primed. Saw-cut cracks exceeding 1/16 inch in width and apply sealant. Apply sealant to expansion, control and construction joints. Apply liquid flashing a distance of inches on each side of cracks and joints.

C. Plywood Substrate: Seal plywood joints and cracks flush. Immediately prior to application of coating, clean surface to remove all residual dust.

D. Mask-off all adjoining areas that are not to receive elastomeric deck coating.

3.03 INSTALLATION

A. Apply primer to concrete surfaces in accordance to manufacturer's recommendations.

B. Install base, intermediate and top coats per manufacturer's instructions and at the required gallons per square feet rates to obtain the dry thickness mils specified in article 2.02.

3.04 CLEANUP

A. Clean stains from adjacent surfaces. Remove foreign matters from finished coating surfaces.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 FIELD QUALITY CONTROL

A. After coating has cured, flood test horizontal area by adding water to a depth of 2 to 3 inches. Retain water at specified depth for a period of 24 hours. If leakage occurs, repair coating and repeat testing.

3.06 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Thermal batt insulation for exterior walls and under roof decks.

2. Thermal batt insulation in furring at concrete or masonry walls.

3. Acoustical batt insulation in partitions and above acoustical ceilings where indicated.

C. Related Sections:

1. Section 05 30 00: Metal Decking.

2. Section 05 41 00: Load-Bearing Metal Studs.

3. Section 09 22 16: Metal Support Assemblies.

1.02 SUBMITTALS

A. Product Data:

1. Material List: Provide a list of materials for installation under this section.

2. Provide manufacturer's printed Product Data for each type insulation and accessory.

B. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

C. Certification: Provide certification that insulation materials conform to requirements of CBC Section 719.

D. Recycled Content: Provide certification that insulation materials contain a minimum of 30 percent recycled materials.

1.03 QUALITY ASSURANCE

A. Surface Burning Characteristics: Flame spread rating shall not exceed 25 and smoke density shall not exceed 50 when tested in accordance with ASTM E 84.

B. Comply with following as a minimum requirement:

1. ASTM C 177 - Standard Test Method for Steady-State Heat Flux-Measurements and Thermal Transmission Properties by Means of the Guarded-Heat-Plate Apparatus.

2. ASTM C 518 - Standard Test Method for Steady-State Heat Flux-Measurements and Thermal Transmission Properties by Means of Heat-Flow-Meter Apparatus.

3. ASTM C 665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

4. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

5. ASTM E 119 - Standard Test Method for Fire Tests of Building Construction and Materials.

6. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site and store in a safe, dry place, with labels intact and legible at time of installation.

B. Protect building insulation materials from damage.

1.05 PROJECT CONDITIONS

A. Avoid exposure to humidity and moisture. Protect from exposure to sunlight.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Owens Corning.

B. Johns Manville.

C. CertainTeed Corporation.

2.02 MATERIALS

A. General:

1. Provide Unfaced, friction-fit batt insulation where both sides of installation are enclosed

2. Provide batt insulation with integral vapor barrier when one side of installation will be unenclosed.

3. Provide batt insulation with integral vapor barrier where at least one side of installation will be exposed to high humidity, such as showers.

4. Recycled content shall be a minimum of 30 percent.

B. Thermal Insulation:

1. R-value: R21

2. Unfaced Mineral Fiber Batt Insulation: Provide friction-fit, unfaced mineral fiber batts. Insulation shall consist of mineral fibers, glass or slag, and thermosetting resins complying with ASTM C 665, Type I.

3. Faced Mineral Fiber Batt Insulation: Provide mineral fiber batts with vapor barrier consisting of mineral fibers, glass or slag, and thermosetting resins complying with ASTM C 665, Type III, Class A, with vapor-retardant membrane facing.

C. Acoustic Insulation: Fiberglass batts, with or without facing, friction fit, incombustible, minimum 3-1/2" thickness unless otherwise indicated, nominal 0.65 to 2.50 pcf density.

D. Fasteners for Attaching Insulation to Underside of Metal Roof Decks:

1. Spindle Anchors: Stic-Klip Mfg. Co., Type A or B as required, with Type S adhesive; Miracle Adhesives Corp. "Miracle StukUps" with Type HT994 adhesive; or Goodloe E. Moore Gemco or Tuff-Weld with G-P Improved or Tuff-Bond Quik-Set Type Adhesive as applicable; or equal. Provide adhesives of correct type for substrates and type of anchor.

2. String Wires: Minimum 18 gage galvanized steel wire.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine Work to verify suitability to receive insulation. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:

1. Fit batt insulation snugly between framing members.

2. Maintain total insulation integrity over entire area to be insulated, including areas between closely spaced members.

3. Extend full thickness insulation over entire area to be insulated. Furnish manufacturer's recommended clips to tightly fit batts at joints.

4. Cut and fit batt insulation tightly around pipes, conduits and penetrations.

5. Do not compress batt insulation in excess of 10 percent (R-19 may be installed in 2x6 stud walls).

6. Prevent batt insulation from sagging during and after installation by installing adequate wire.

7. Metal door and window frames in acoustically insulated walls shall be filled with insulation, unless otherwise indicated.

8. Where vapor barrier is provided, install with vapor barrier facing room.

a. Batts In Metal Framing: Provide friction-fit batts tightly fitted to stud webs and to metal furring.

b. Batts Under Metal Roof Decks where underside of insulation will be exposed install foil-faced flanged-type insulation batts and staple flanges together at maximum 4" centers and seal joints at abutting vertical surfaces with a pressure-sensitive plastic tape. Where underside of insulation will be inaccessible, install secure with spindle anchors. Provide 18 gage galvanized string wires under batts wherever necessary to prevent sagging. Stretch wire taut.

c. Batts In Horizontal or Sloped Applications: Provide tightly stretched string wires along center of horizontal or sloping batts where support spacing exceed 16" on centers.

d. Batts in Ceiling Framing: Install batts between joists, so top of insulation is level with top of framing members. Do not install insulation over recessed lighting fixtures, speakers, or other heat producing elements in ceilings. At junction boxes, access panels, and other items requiring access from above or below ceiling, cut insulation on each side to fit item and install loosely on top. Fit insulation snugly around ducts, conduits, pipes, and other items projecting through ceiling construction.

3.03 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 07 22 00

ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Tapered polyisocyanurate roof insulation as indicated.

C. Related Sections:

1. Section 03 30 00: Cast-in-Place Concrete.

2. Section 07 51 13: Built-up Asphalt Roofing.

3. Section 07 60 00: Flashing and Sheet Metal.

1.2 SYSTEM DESCRIPTION

A. Regulatory Requirements: Comply with requirements of DSA and/or authorities having jurisdiction over the Work.

1.3 SUBMITTALS

A. Shop Drawings: Submit roof plans and details. Include roof dimensions, drain and scupper locations, gutter locations, and the layout of insulation boards. Provide details indicating components, attachment and insulation thickness. Provide calculations indicating the average R-value for the system. Indicate drainage patterns and slopes required.

B. Product Data: Submit manufacturer's data substantiating the insulation complies with specified requirements.

C. Installation Instructions: Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. ASTM C 1289 - Faced Rigid Cell Polyisocyanurate Thermal Insulation Board; Type 2.

2. Provide systems complying with requirements for FM Class 1.

3. Provide systems complying with requirements for UL Class A.

4. Achieve a minimum thermal resistance value of R-7 for re-roofing projects, unless noted otherwise.

B. Qualifications: Installers: Minimum 5 years experience installing specified type of insulation under roofing systems, and certified by the insulation manufacturer to install the Work of this section.

C. Pre-installation Meetings: In accordance with related Division 01 sections, conduct a pre-installation meeting on the Project site.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original sealed and labeled containers.

B. Avoid exposure to sunlight and the elements.

C. Handle materials in a manner to avoid damage or contamination with moisture or foreign matter.

1.6 PROJECT CONDITIONS

A. Environmental requirements:

1. Install products in strict accordance with manufacturer's recommendations.

2. Do not install any materials when water in any form is present on the deck or materials are wet. Do not install any materials if precipitation is forecast and partially completed Work will be left unprotected.

3. Do not install the Work of this section if the temperature of the roof deck is below 40 degrees F.

PART 2 - PRODUCTS

2.1 GENERAL

A. Roof and Deck insulation components shall be manufactured by:

1. Dyplast Products — Dyplast Products
1-800-433-5551
12501 NW 38th Ave
Miami, FL 33054
www.dyplastproducts.com

2. Johns Manville Corp. JM Corporate Headquarters
717 17th Street
Denver, Colorado 80202
Phone: 303.978.2000

3. Atlas Roofing Corporation
Atlas Roofing Corporation
2000 RiverEdge Pkwy, Suite 800, Atlanta, GA 30328.
Ph. (770) 952-1442
Fax (770) 952-3170

4. Celotex Insulation Celotex Building Products
32332 Camino Capistrano
San Juan Capistrano, CA 92675

5. GAFTEMP G.A.F.
11800 Industry Avenue
Fontana, CA 92337

B. Insulation shall be rigid polyisocyanurate foam insulation, with specially formulated organic/inorganic facers as manufactured by Dyplast Products, Johns Manville Corp, Atlas Roofing Corp, Celotex Building Products, or G.A.F.

2.2 DESCRIPTION

A. Tapered Roof insulation shall provide 1/4 inch minimum per foot slope and provide minimum R21 insulation value.

B. Roof and Deck insulation shall consist of polyisocyanurate foam panels, chemically bonded during the foaming process to special organic/inorganic facers on the top and bottom surfaces, and shall conform to the following:

PROPERTIES	TEST METHOD	VALUE
Compressive Strength	ASTM D 1621	16PSI min.
Dimensional Stability (Thermal & Humid Aging)	ASTM D 2126 (-4 degrees F, amb RH) (158 degrees F, 97 percent RH) (200 degrees F, ambient RH)	<2.0 percent Linear change <2.0 percent Linear change <2.0 percent Linear change
Flexural Strength (Modulus of Rupture) (Break load)	ASTM C 203	40 PSI min. 17 PSI min.
Tensile Strength (Perpendicular to surface)	ASTM C 203	500 PSF min.
Water Absorption	ASTM C 209	
Water Vapor Transmission	ASTM E 96	
Core Foam Flame Spread	ASTM E 84	

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify suitability of substrates to receive the Work. Do not proceed until unsatisfactory conditions have been corrected.

B. Verify suitability of related Work such as the following:

1. Roof drains and scuppers are properly installed.

2. Roof curbs, nailers, equipment supports, vents, and other items penetrating the roof are of the proper height, properly prepared and fastened to the substrate.

3. Concrete surface are sufficiently dry, free from extremes in pH, properly primed and free of fines, edges, or voids.

3.2 INSULATION APPLICATION

A. General:

1. Install the Roof and Deck insulation in accordance with the manufacturer's recommendations and to provide the R values indicated. Butt the panels snugly together.

2. Start boards from either the roof drain or the high point depending on the insulation system. Stencil direction of slope on each board. Stagger joints of underlayment boards from insulation boards.

3. Cut valleys and hips. Field cut crickets from insulation boards. Install valleys, hips, and crickets as required for R values and drainage.

B. All Roofing Systems: Fasten insulation with a method recommended by the manufacturer. Method of attachment shall provide a minimum FM 1-90 Wind Uplift Rating.

3.3 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.4 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 44 56

FIBER CEMENT BOARD PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Heavy duty fiber reinforced cement board panel exterior cladding system.

B. Accessories required for complete installation.

C. Related Sections

1. Section 05 40 00 - Cold Formed Metal Framing
2 Section 07 21 00 - Thermal Insulation
3. Section 07 92 00 - Joint Sealants
4. Section 08 31 00 - Access Doors and Panels
5. Section 09 29 00 – Gypsum Board: Gypsum Board Sheathing
6. Section 09 22 00 - Supports for Plaster & Gypsum Board

1.2 REFERENCES

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures

B. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

C. ASTM C 1186 - Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.

F. ASTM E 136-81

1.3 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Design and size components to withstand live loads caused by pressure of wind acting normal to plane of wall as calculated in accordance with ANSI/ASCE 7, and as measured in accordance with ANSI/ASTM E330.
2. Deflection: Provide system capable of withstanding wind loading within the following limitations:

a. No permanent deformation is acceptable.

3. Design system to accommodate, without damage to system, components or deterioration of seals; movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.
4. Design to accommodate vertical inter-story movement and provide an allowance for the following tolerances:

   a. Building floor slab live load differential deflection.
   b. Structural creep.
   c. Thermally induced expansion and contraction of framing members.
   d. Fabrication and erection tolerances.
   e. Design ultimate load capacity of anchor components to withstand 2.0 times "Design Wind Load" without failure.

5. Maintain continuous air and vapor barrier throughout assembly.

Physical Properties	HD
Density, dry, pcf	105
Moisture Content, normal, %	5
Modulus of Rupture, psi, MD CMD	3200 2500
Modulus of Elasticity, psi x10^6	1.4
Tensile Strength, psi, MD (Parallel to surface) CMD	2300 1600
Compressive Strength, psi	11,600
Impact Strength, lb-ft/ft^2	230
Water Absorption, %, oven dry - saturation	6-18
Thermal Conductivity, BTU-in/ft^2, hr, °F	2.1
Coefficient of Thermal Expansion, in/in, °F, x10^{-6} 68 °F - 212 °F	5.0
Moisture Movement, in/ft Oven dry - saturation	.04
Surface Burning Characteristcs, Class I Flame spread Smoke developed	 0 0
Continuous Maximum Temperature, °F	250
Non-combustible	ASTM E 136

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

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, including fastening patterns.

C. Shop Drawings: Provide shop drawings and erection plans for review including the following:

1. Layout of furring, weather barrier, finished sheets and fastener pattern.
2. Details at metal framed soffits, joints between panels, openings for light fixtures and at other openings and connections.
3. Shop drawings prepared and stamped by a structural engineer licensed in the state where the project is located.

D. Calculations: Provide wind load calculations, engineering calculations and substantiating data to validate wind resistance of roof system.

E. Product certificates including Research/Evaluation report or Code Authority approval of the system use for intended application.

F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

G. Verification Samples: For each finish product specified, three samples, minimum size 3 inches by 6 inches square, representing actual product, color, and patterns.

H. Manufacturer's Certificates: Certify materials and accessory component products meet or exceed specified requirements.

I. Manufacturer's warranties. Executed by manufacturer and installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Provide installer with not less than three years of experience with products similar to those specified.

B. Mock-Up: Provide a mock-up of complete panel system including furring, insulation, weather barrier and panels for approval by Architect.

1. Finish areas designated by Architect.
2. Mock-ups shall be a minimum of 4 panels showing horizontal joints and opening for a light fixture and complete installation system and fastener layout

for metal framed soffits.

3. Do not proceed with remaining work until workmanship and color are approved by Architect.
4. Refinish mock-up area as required to produce acceptable work.

C. Pre-Installation Conference:

1. Prior to any panel application, the Contractor shall convene a pre-installation conference.
2. Coordinate conference scheduling with the Architect. Conference shall be attended by the Contractor, Architect, personnel directly responsible for the installation of panels, flashing and sheet metal work and other trades interfacing with the panel work.
3. Provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.
4. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cement panels to site until job is ready for their installation.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store materials off the ground, flat and under cover in a dry place until erection.

D. Keep materials dry and protect from freezing.

E. Store materials in such a way to accommodate easy inspection of the materials prior to installation.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Installed material shall have a manufacturer's warranty for the following period:

1. 5 years.

B. Warranty includes the repair or replacement of panels that do not comply with

requirements or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming or otherwise deteriorating beyond normal weathering.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Cembrit, distributed by American Fiber Cement Corporation: 6901 S. Pierce St., Suite 260, Littleton, Colorado 80128 USA. 303-972-5103 or 800-688-8677 ext. 102.

B. Or approved equal.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 MATERIALS

A. Fiber Cement Board Panel Basis of Design: Minerit HD External Cladding, fiber reinforced, cement based product conforming to ASTM C 1186 and manufactured of cement sand, cellulose fibers and fillers.

1. Panel Size:

   a. 1/4 inch 4 feet by 8 feet.

2. Colors:

   a. Natural colors (non-treated material):

      1) Gray - Natural.

3. Mechanical fasteners: Use stainless steel screws with 3/8" diameter washer head. Holes must be predrilled into sheet with clearance around screw threads.

   a. Fasteners must never be positioned closer than 1/2" from the edge, or 3" from the corner of a panel.

Wind Load/Fastening Schedule - Minerit HD

Wind Load lbs/ft^2	Board Thickness (in)	Fastener Type	24" O.C.			16" O.C.			
			P	C	P	P	C	C	P
20	1/4"	Screw	8"	12"	8"	12"	16"	16"	12"
40	5/16"	Screw	8"	12"	8"	12"	16"	16"	12"
>40	3/8" 1/2"	Screw	Must be calculated for each system.						

2.3 ACCESSORIES

A. Trim: PVC, composite and stainless steel trim shapes suitable for trim conditions.

B. Sheet Metal Flashing: Minimum 26 gauge hot-dipped galvanized steel sheet, or stainless steel.

C. Metal furring shall conform to the requirements of Section 09 22 16.

D. Rigid insulation between furring channels shall comply with Section 07 21 00. Thickness of insulation shall be as indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Ensure that framing is completed and that electrical rough-in, windows, doors, and flashing are in place before proceeding with work of this section.

C. 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. Repair as necessary any substrate conditions that would be detrimental to proper installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Ensure that all dust, dirt, fingerprints and all other foreign marks on the material are removed prior to installation of the panels.

3.3 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions and the approved shop drawings.

B. Panel Cutting:

1. Cut panels using a high speed circular saw with a segmented diamond blade.
2. Cut panels from the front side and protect the face from being damaged during cutting.
3. For incidental cuts, cut panels from the front side using a jigsaw with a carbide tip blade.

4. Provide adequate ventilation during cutting. Use of a dust extractor is recommended.

C. Drilling:

1. Drilling of holes must be done from the front of the panel using a carbide tip drill bit.
2. Holes are recommended to be done using a universal drill.
3. Larger holes, or cut-outs on the panel, can be made by a jig saw with a carbide blade or a hole saw with a diamond blade.

D. Prepare structural backing with studs, backer board, weather barrier and furring as required to meet the performance requirements specified. Install fiber reinforced panels over a properly prepared support system in accordance with the manufacturer's installation instructions and approved shop drawings.

E. Install weather barrier over prepared substrate.

F. Fiber reinforced cement panel siding shall be installed over an impervious weather barrier, on furring strips with black EPDM rubber strips, and with an air cavity behind the face panel to allow ventilation of the substrate.

G. Panels shall be attached to furring using the attachment pattern and fasteners indicated in the manufacturer's installation instructions and approved shop drawings.

H. Install black EPDM rubber strips to each furring member.

I. Pre-drill holes in cement boards in pattern indicated in the manufacturers installation instructions and approved shop drawings. Holes shall be of size as specified by the panel manufacturer for the fasteners being used.

J. Fasten fiber cement board to furring as per vendor's details with approved stainless steel fasteners.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Inspect walls for any damage. Replace panels that are damaged. Do not attempt to repair.

C. Ensure all dirt, dust, fingerprints and all foreign marks are immediately removed from the face of the material to avoid from permanent damage.

D. Replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 46 10

FIBER CEMENT LAP SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiber cement lap siding, panels, single, trim, fascia, moulding and accessories, James Hardie HZ5 Engineered for Climate Siding.

1.2 RELATED SECTIONS

A. Section 05 41 00 - Load-Bearing Metal Studs

B. Section 07 21 00 - Insulation: Exterior wall insulation.

1.3 REFERENCES

A. ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets

B. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

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.

C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. 4' x 7' section including transitions to cement plaster, aluminum window, base and corner as per details xx/xx. Mock-up may become part of final installation if accepted.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
   1. HardiePlank HZ5 lap siding for 30 years.

B. Product Warranty: Limited, product warranty.
   1. HardieTrim HZ and HZ5 boards for 15 years.

C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Email: request info (info@jameshardie.com);

B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01 25 00.

2.2 SIDING

A. HardiePlank HZ5 lap siding for Materials:
   1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.
   2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible material.
   3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
   4. CAL-FIRE, Fire Engineering Division Building Materials Listing - Wildland Urban Interface (WUI) Listed Product.
   5. National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI, IBC, IRC).
   6. City of Los Angeles, Research Report No. 24862.
   7. US Department of Housing and Urban Development Materials Release 1263d.
   8. California DSA PA-019.

B. Lap Siding: HardiePlank HZ5 Lap siding with a sloped top, beveled drip edge and nailing line as manufactured by James Hardie Building Products, Inc.
   1. Type: Smooth 6-1/4 inches (159 mm) with 5 inches (127 mm) exposure.

C. Lap Siding: HardiePlank HZ5 Lap siding as manufactured by James Hardie Building Products, Inc.
   1. Type: Beaded Smooth 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.
   2. Type: Beaded Cedarmill 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.

D. Trim:
   1. HardieTrim HZ5 boards and HardieTrim HZ boards as manufactured by James Hardie Building Products, Inc.
   2. Artisan HZ5 Accent trim as manufactured by James Hardie Building Products, Inc.

2.3 FASTENERS

A. Metal Framing:
   1. Metal Framing: 1-1/4 inches (32 mm) No. 8-18 by 0.375 inch (9.5 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.
   2. Metal Framing: 1-5/8 inches (41 mm) No. 8-18 by 0.323 inch (8.2 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.
   3. Metal Framing: 1 inch (25 mm) No. 8-18 by 0.323 inch (8.2 mm) head self-drilling, corrosion resistant ribbed buglehead screws.
   4. Metal Framing: 1 inch (25 mm) No. 8-18 by 0.311 inch (7.9 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.
   5. Metal Framing: 1.5 inch (38mm) [AGS-100] .100 inches by 25 inches (2540 mm by 635 mm) ET&F Pin or equivalent pneumatic fastener.

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.
   1. Primer: Factory primed by James Hardie.

2. Topcoat: Refer to Section 09 91 00 and Exterior Finish Schedule.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared. Review substrate to ensure preparation is free from defects that would cause siding installation to appear visually wavy.

B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Minimum 20 gauge 3-5/8 inch (92 mm) C-Stud 16 inches maximum on center or 16 gauge 3-5/8 inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
   1. Install water-resistive barriers and claddings to dry surfaces.
   2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
   3. Protect siding from other trades.

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.

C. Install a water-resistive barrier is required in accordance with local building code requirements.

D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

E. Install Engineered for ClimateTM HardieWrapTM weather barrier in accordance with local building code requirements.

F. Use HardieWrapTM Seam Tape and joint and laps.

G. Install HardieWrapTM flashing, and HardieWrapTM Flex Flashing

3.3 INSTALLATION - HARDIEPLANK HZ5 LAP SIDING

A. Install materials in strict accordance with manufacturer's installation instructions.

B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.

C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.

D. Align vertical joints of the planks over framing members.

E. Maintain clearance between siding and adjacent finished grade.

F. Locate splices at least one stud cavity away from window and door openings.

G. Wind Resistance: Where a specified level of wind resistance is required Hardieplank lap siding is installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER-405.

H. Locate splices at least 12 inches (305 mm) away from window and door openings.

3.4 INSTALLATION - HARDIETRIM HZ5 BOARDS

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.

B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.

C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.

D. Maintain clearance between trim and adjacent finished grade.

E. Trim inside corner with a single board trim both side of corner.

F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.

G. Allow 1/8 inch gap between trim and siding.

H. Seal gap with high quality, paint-able caulk.

I. Shim frieze board as required to align with corner trim..

J. Fasten through overlapping boards. Do not nail between lap joints.

K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.

L. Shim frieze board as required to align with corner trim.

3.5 FINISHING

A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 51 13

COLD PROCESS BUILT- UP ASPHALT ROOFING SYSTEM

PART I – 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.

B. Site Specific Projects New construction.

1. Set up and staging areas will be decided upon at the job walk. Roofer will use enclosed chutes and dumpsters to help minimize debris. New Roofs: Clean deck thoroughly prior to roofing installation.
2. The roof decks will be inspected by a District representative and material manufacturer.

1.2 SUMMARY

A. This Section includes the following:

1. Cold Process Built-up asphalt roofing system.
2. New metal edging, coping and flashing as needed.
3. Roof Insulation as outlined
4. Installation of SBS Modified Bitumen membrane which is factory coated with a white acrylic coating and which is certified by the CRRC (Cool Roof Rating Council) as meeting the requirements of California's Title 24 Building Energy Efficiency Standards.
5. Adhesive for the white cap sheet to be White on White Adhesive designed specifically for tile T-24 Membrane.
6. Apply Ice Coating to T-24 Membrane.
7. On all parapet walls that are not wrapped with base flashing, prime and install two coats of Tremco Wall-Tite White Elastomeric Coating.
8. Install new reinforced Hypalon Flashing to all wall, base, and curb flashing.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Cold Process Built Up Roofing - An asbestos free formulation of asphalt, solvent, thixotrope, mineral stabilizer and reinforcing fibers used as an interply adhesive and flood coat.

C. Initial Emittance: Minimum initial emittance of roofing surface (system) threshold in compliance with Cool Roof Rating Council requirements.

D. Initial Reflectance: Minimum initial reflectance threshold of roofing surface (system) in compliance with Cool Roof Rating Council requirements.

E. Comply with Title 24, 2007 California Building Energy Standards, Section 118

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL or FMG. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

D. Wind Uplift Test: UL 580 Uplift Resistances of Roofing Assemblies.

1. Minimum 90 Ibs psf.

E. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and/or FMG 4470 as part of a roofing system.

1. Roofing system shall comply with the following:

a. FM 1-49 Loss Prevention Data Sheet for Perimeter Flashing.
b. FM 1-28 Loss Prevention Data Sheet for Wind Loads to Roof Systems and Roof Deck Securement.
c. FM 1-29 Loss prevention Data Sheet Above Deck Roof Components.
d. NRCA Manual for Low-Slope Roofing Construction Details (Fifth Edition).
e. SMACNA Manual (Fifth Edition).
f. ASCE 7, Chapter 6.

F. Roofing Membrane Load-Strain Properties

1. Provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following minimum load-strain properties at membrane failure when tested according to ASTM D 2523:
2. Tensile strain at failure: 798 Ibf machine direction; 702 lbf cross-machine direction.

G. Solar Reflectance Index (SRI) – Cap sheet required to have an SRI of 82 or greater to achieve HPI-CHPs point SS4.2

1.5 SUBMITTALS

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

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.

1. Base flashings, cants, and membrane terminations.
2. Crickets, saddles, and tapered edge strips, including slopes.
3. Insulation fastening patterns.

C. Samples for Verification: For the following products:

1. 4-by-12-inch square of base sheet.
2. 4-by-12-inch square of ply sheet.
3. 4-by-12-inch square of modified cap sheet.
4. 4-by-12-inch square of roof insulation and cover board.

D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

F. Qualification Data: For Installer, manufacturer and manufacturer's technical representative as specified in "Quality Assurance" Article.

G. Manufacturer Certificates: Indicating compliance of proposed products with requirements, including:

1. Product Compatibility: Indicate manufacturer has verified compatibility of roofing system components, including but not limited to: Roofing base and ply sheets, membrane backer and flashing sheets, reinforcement fabric felts and mats, adhesives, mastics, coatings, and sealants.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system and system components.

1. Include report showing compliance with ASTM 2523 load-strain properties requirements.

I. Maintenance Data: For roofing system to include in maintenance manuals.

J. Warranties: Special warranties specified in this Section.

K. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

L. Certificate of Insurance showing Products Liability in the amount of $25 million minimum and provide an affidavit signed by a corporate officer showing corporate net worth of $50 million minimum.

M. Provide certification listing on the current Energy Star® Roof Products Qualifying Products List.

N. Provide a list often (10) projects available for inspection employing same roof system. Provide location, contact name, and telephone number.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

B. Installer Shall:

1. Submit an affidavit attesting that Contractor has in place and fully implemented a written Health, Safety and Environmental Plan and the plan is compliant with all applicable Federal, State and Local regulations. .
2. Be experienced in cold applied roofing applications for 10 years minimum.
3. Be acceptable to Owner.
4. Be a manufacturer Certified Contractor.
5. Not have been in Chapter 7 bankruptcy during the last ten (10) years.

6. Provide a list of ten (10) projects available for inspection employing same roof system.
7. Acquire inspection service days utilizing manufacturer's technical inspectors.

    a. The minimum number of full time Technical Service inspection days will be six (6) days for a project of 200 squares or less.
    b. The number of days will increase at a rate of two (2) day for each additional 100 squares.

C. Manufacturer Qualifications: A qualified manufacturer that has UL listing and FMG approval for roofing system identical to that used for this Project.

D. Manufacturer Shall:

1. Be Associate Member in good standing with National Roofing Contractors Association (NRCA) for at least five (5) years.
2. Be nationally recognized in the roofing, waterproofing and moisture survey industry.
3. Be approved by Owner.
4. Has not been in Chapter II bankruptcy during the last five (5) years.
5. Provide evidence of financial responsibility: Certificate of Insurance showing Products Liability in the amount of $25 million minimum and provide an affidavit signed by a corporate officer showing corporate net worth of $50 million minimum.
6. Provide a copy of Corporate Health, Safety and Welfare policy.
7. Manufacturer must manufacture a minimum of 70% of the materials that they supply, by dollar volume, in facilities owned or solely leased by said manufacturer, including equipment used in manufacturing operations.
8. Provide evidence of twenty (20) quarters of continuous plant inspections of roofing manufacturing sites over the previous five (5) years by an independent Nationally Recognized Testing Laboratory (NRTL) as defined in 29 CPR Ch. XVII (7-1-93 Edition) from the Occupational Safety and Health Administration (OSHA).
9. Be ISO 9001; 2000 registered for at least the prior five (5) years
10. Furnish a service agreement / warranty.
11. Provide Owner names of at least five (5) qualified applicators.
12. Employ full-time Field Technical Services Representatives for daily job-site monitoring and production of daily reports.
13. Require local Field Representatives to make periodic job-site visits and produce work quality and progress reports.
14. Provide a Project Closeout Report upon delivery of the project warranty. This report to include:

    a. Project Specifications.
    b. Project Summary.
    c. Progress reports as a result of roof inspections.

d. Job-site progress photos.
e. Warranty document.
f. Owner's Manual describing maintenance and emergency repair.

E. Manufacturer's Technical Representative Qualifications: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.

F. Source Limitations: Obtain components for roofing system from or approved in writing by roofing system manufacturer.

G. Pre-installation Conference: Conduct conference at Project site. Comply with requirements in Section 01 31 00 Project Management and Coordination. Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Special Warranty: Tremco QA Fifteen Year Manufacturer's Warranty and Service Agreement in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, all sheet metal-related details, and termination details.
2. Manufacturer will provide, at no cost to owner, the following services in Years 2, 5, and 10:
    a. Inspection by a Technical Representative and delivery of a written inspection report documenting roof conditions.
    b. Preventative maintenance and necessary repairs, including splits, tears, or breaks in the roof membrane system and flashings that threaten the integrity of the roof system and are not exempt from coverage due to neglect, negligence, vandalism, or other exclusion.
    c. General rooftop housekeeping and clean-up, subject to limits, but generally including removal of incidental debris.
3. Warranty Period: 15 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

1. Built-up Asphalt Roofing;

a. Tremco, Inc.
Contact: Bill Calagna
805-499-5663 or 818-429-2584

2.2 BASE-SHEET MATERIALS

A. Backer Sheet: Tremco Burmastic Composite Ply Premium Green ASTM D 460 I-04, Type II, SBS-modified asphalt-coated Trilaminate reinforced high-strength ply sheet, with polyester/glass-fiber/polyester-reinforcing coated with waterproofing asphalt. Burmastic Composite Ply Premium Green contains 14-per cent post-industrial recycled content.

1.	Weight	36.9 lbs/100 sq ft	ASTM D 228-05
2.	Tensile Strength MD	220 lbf/in	ASTM D 5147-02
3.	Tensile Strength XMD	235 lbf/in	ASTM D 5147-02
4.	Tear Strength MD	345 lbf	ASTM D 5147-02
5.	Tear Strength XMD	330 lbf	ASTM D 5147-02
6.	Elongation MD	6.5%	ASTM D 5147-02
7.	Elongation XMD	6.5%	ASTM D 5147-02

2.3 ROOF SURFACING

A. SBS Modified Bitumen Cap Sheet: Tremco Power Ply Standard FR T24 ASTM D 6163, Grade G, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced with factory applied white acrylic coating; suitable for application method specified, and as follows:

1. Exterior Fire-Test Exposure, ASTM E 108: Class A.
2. Tensile Strength at 73 deg. F, minimum, ASTM D 5147: machine direction 81.0 lbf/in; cross direction 76.5 Ib/in.
3. Tear Strength at 73 deg. F, minimum, ASTM D 5147: machine direction, 1041bf; cross direction 108 Ib/in.
4. Elongation at 73 deg. F, minimum, ASTM D 5147: machine direction 7.76 percent; cross. direction 7.93 percent.
5. Low Temperature Flex, maximum, ASTM D 5147: -15 deg. F.
6. Thickness, minimum, ASTM D 5147: 0.120 inch.
7. Reflectance, minimum ASTM C 1549-02, 71.23%
8. Thermal Emittance, minimum ASTM C 1371-98, .87
9. Solar Reflectance Index (S.R.I.): 87
10. Title 24 compliant and rated at least 0.70 in initial reflectance and a minimum of 0.75 in initial emittance by the Cool Roof Rating Council (CRRC).

2.4 FLASHING MATERIALS

A. Backer Sheet: Tremco Burmastic Composite Ply Premium Green ASTM D 460 I-04, Type II, SBS-modified asphalt-coated Trilaminate reinforced high-strength ply sheet, with polyester/glass-fiber/polyester-reinforcing coated with waterproofing asphalt. Burmastic Composite Ply Premium Green contains 14-per cent post-industrial recycled content.

1.	Weight	36.9 Ibs/100 sq ft	ASTM D 228-05
2.	Tensile Strength MD	220 lbf/in	ASTM D 5147-02
3.	Tensile Strength XMD	235 lbf/in	ASTM D 5147-02
4.	Tear Strength MD	345 lbf	ASTM D 5147-02
5.	Tear Strength XMD	330 lbf	ASTM D 5147-02
6.	Elongation MD	6.5%	ASTM D 5147-02
7.	Elongation XMD	6.5%	ASTM D 5147-02

B. Flashing Sheet, SBS Modified Bitumen Cap Sheet: Tremco Power ply Standard FR T24 ASTM D 6163, Grade G, Type **I,** glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced with factory applied white acrylic coating; suitable for application method specified, and as follows:

1. Exterior Fire-Test Exposure, ASTM E 108: Class A.
2. Tensile Strength at 73 deg. F, minimum, ASTM D 5147: machine direction 81.0 Ibf/in; cross direction 76.5 Ib/in.
3. Tear Strength at 73 deg. F, minimum, ASTM D 5147: machine direction, 1041bf; cross direction 108 lb/in.
4. Elongation at 73 deg. F, minimum, ASTM D 5147: machine direction 7.76 percent; cross direction 7.93 percent.

5. Low Temperature Flex, maximum, ASTM D 5147: -15 deg. F.
6. Thickness, minimum, ASTM D 5147: 0.120 inch.
7. Reflectance, minimum ASTM C 1549-02, 71.23%
8. Thermal Emittance, minimum ASTM C 1371-98, .87
9. Title 24 compliant and approved by Cool Roof Rating Council (CRRC).

C. Glass-Fiber Fabric: Tremco Burmesh Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type 1.

D. Flashing Adhesive: Asphalt based, heavily fib rated mastic.

E. Metal Flashing Sheet: 24 gage galvanized sheet metal.

1. Metal counter flashing.
2. Metal gravel stop.
3. Metal coping.
4. Metal termination bar.

F. Metal edge stripping ply: Vinyl coated woven glass mesh.

G. Hypalon Flashing.

1. Hypalon Flashing Membrane – Reinforce CSPE 0.045 inches thick.
2. Flashing Adhesive – Sheeting Bond Adhesive.
3. Heat Seaming.
4. Termination Mastic – Polyroof and Burmesh Membrane.

2.5 ASPHALT MATERIALS

A. Asphalt Primer: Tremco Tremprime WB ASTM D 41.

B. Cold-Applied Adhesive: Tremco Burmastic LV standard asphalt-based, I-part asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up roofing membranes and flashings. Each container labeled with UL and FM logos indicating material was manufactured under the specified UL and FM quality assurance programs.

1.	Asbestos Content	ASTM D 276	None
2.	Viscosity	ASTM D 2196	80,000-200,000 cP
3.	Density	ASTM D 1475	8.2 b/gal
4.	VOC	ASTM D 3960	Compliant with local building codes

2.6 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.

B. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

C. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion resistance provisions in FM 4470; designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.

D. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

Touch-up Paint: High Build Reflective Coating

Tremco White on White Adhesive is to be used to adhere the T-24 Modified Sheet to the newly installed roofing system.

2.7 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thickness indicated.

1. New Construction: R-21. See 07 22 00 for Roof and Deck Insulation requirements.

B. Cover Board: ASTM C 208, Type II, Grade I, cellulosic-fiber insulation board, 25/32 inch thick with premium asphalt coating on all six sides.

1. Compressive Strength 20 psi ASTM C 165
2. Density, nominal 151blcf ASTM C 209
3. Temple Inland Fiberboard

C. Insulation-Board Adhesive: Tremco Fas N Free One part solvent free, moisture curing, asphaltic urethane, asbestos free FM approved insulation adhesive.

1. Tensile Strength 200 psi ASTM D 412
2. Elongation 1200% ASTM D 412

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

1. Provide positive drainage through entire valley areas.
2. Polyisocyanurate cricket material with 1/2 inch thick cellulosic-fiber covers board. All crickets and cant strips to be installed with specified Fas N Free solvent free insulation adhesive.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing per warrantable standards.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place and free flowing.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Make sure and protect the inside of the facilities per Districts procedures. Before any re-roofing can take place, the Districts representative will sign off on the decks and authorize any replacement per unit costs given by roofer.

B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

D. Over metal decks:

1. Install one layer of specified fiberboard insulation under area of roofing to achieve required thickness.
2. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
3. Install layer of insulation to deck according to FM 1-29 Loss Prevention Data Sheets with specified solvent free insulation adhesive. Coverage rate is two (2) gallons per square.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

3.4 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer's recommendations.

B. Install roofing membrane, base flashings, and component materials in compliance with requirements in FMG 4450 and/or FMG 4470 as part of a membrane roofing system as listed in FMG's "Approval Guide" for fire/windstorm classification indicated. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49.

C. Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above:

1. Metal Parapet Cap (Coping) and Base Flashing: Plates BUR-I and BUR-I S.
2. Embedded Edge Metal Flashing: Plates BUR-3 and BUR-3S.
3. Surface-mount Counter flashing: Plates BUR-4 and BUR-4S.
4. Base Flashing for Wall Supported Deck: Plates BUR-5 and BUR-5S.
5. Base Flashing for Vented Base Sheet: Plates BUR-SA and BUR-5AS.
6. Expansion Joint with Metal Cover: Plates BUR-7 and BUR-7S.
7. Expansion Joint with Pre-Manufactured Cover: Plates BUR-7A and BUR-7AS.
8. Equipment Support Curb: Plates BUR-9 and BUR-9S.
9. Equipment Support Stand with Typical Rain Collar: Plates BUR-II and BUR-II S.

10. Raised Curb Detail: Plates BUR-13 and BUR-13S.
11. Skylight, Scuttle, and Smoke Vent: Plates BUR-I 4 and BUR 14S.
12. Isolated Stack Flashing: Plates BUR-17A and BUR-17AS.
13. Plumbing Vent: Plates BUR-I 8 and BUR-18S.
14. Penetration Pocket: BUR-I 9 andBUR-19S.
15. RoofDrain: BUR-20 andBUR-20S.
16. Gutter: BUR-22 and BUR-22S.

D. Start installation of built-up roofing membrane in presence of roofing system manufacturer's technical personnel. Roofing contractor must have approval from Material Manufacturer and District to begin.

E. Where roof slope exceeds 2 inch per 12 inches, install sheets of built-up roofing membrane parallel with slope.

1. Back nail roofing membrane sheets to substrate according to roofing system manufacturer's written instructions.

F. Cooperate with testing and inspecting agencies engaged or required to perform services for installing built-up roofing system.

G. Coordinate installing roofing system components so insulation and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

H. Cold Process Asphalt Heating

1. An in-line heat exchange unit may be used to facilitate application.

   a. Do not exceed maximum adhesive temperature of 1000 F.

2. Heat exchange unit: Use heat transfer oil approved by heating equipment manufacturer.
3. Follow operation procedures recommended by heating equipment manufacturer.

I. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.5 ROOFING MEMBRANE INSTALLATION (OVER INSULATION SYSTEM)

A. Install two base sheets starting at low point of roofing system. Align sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.

1. Cut plies in 18'-20' lengths maximum and allow to relax.
2. Embed each ply sheet in a solid coating of cold applied adhesive at rate of 2 gallI00 sq ft, to form a uniform membrane without ply sheets touching.

B. Cap Sheet: Install lapped granulated cap sheet starting at low point of roofing system. Offset laps from laps of preceding ply sheets and align cap sheet without stretching. Lap in direction to shed water. Extend cap sheet over and terminate beyond cants.

1. Embed cap sheet in a solid application of white cold applied adhesive (White on White) applied at rate required by roofing system manufacturer. Application Rate is 2 gallons per 100 sq. ft.

3.6 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing membrane at cants in flashing adhesive.
3. Flashing Sheet Application: Adhere to backer sheet in flashing adhesive.

B. Extend base flashing up walls a minimum of 8 inches above roofing membrane and 6 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

1. At parapets walls, extend flashing sheet up entire wail and mechanically fasten at outside edge of nailer below coping cap.
2. At high parapet walls, extend flashing sheet up wall 8-12 inches above roofing membrane and secure edge with butyl TF sealant tape and termination bar fastened at 8 inches OIC.
3. Install 24 ga. galvanized metal counter flashing at all vertically terminated base flashings.

4. For existing roofs (as applicable): Architect/District verify the following existing condition(s): On all parapet walls that are not wrapped with base flashing, prime and install two coats of Tremco Wall-Tite White Elastomeric Coating.

D. Install 4 inch and 6 inch stripping plies where metal flanges and edgings are set on built-up roofing.

1. Set in flashing adhesive.

E. Install all edge metal, metal counter flashing, and metal coping according to NRCA details and industry standards and manufacturers warrantable details.

F. Pipe penetrations: Install split lead flashing and strip in edges same as metal edges.

G. Irregular penetrations: Use Chem Curb flashing component system. Must be approved by material manufacturer first.

H. Roof Drains: Set 30-by-30-inch 4 lb. lead flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

I. Install stripping of not less than two roofing membrane ply sheets, each set in a continuous coating of asphalt roofing cement.

J. Install new reinforced hypalon, lead jack or sheet metal flashing to all pipes and penetrations, as required by roofing manufacturer. Seal penetration with an counter flashing umbrella, TF-Tape, and clamping ring.

K. Install new reinforced hypalon, lead jack or sheet metal flashing to all pipes and penetrations, as required by roofing manufacturer. Seal penetration with an counter flashing umbrella, TF-Tape, and clamping ring.

L. Install Reinforced Hypalon Flashing to all perimeter walls, base, and curb flashing; install batten bars and flashing tape to middle of walls greater than 12" in height. Install batter bars/termination bars at the top of all base or curb flashing, with TF-Tape, and secure to wall with fasteners.

M. Install reinforced hypalon flashing up and over the parapet wall, and nail to wood nailer on the outside.

N. Install new batten bars to middle of hypalon sheeting with mechanical fasteners and two sided sealant-tape.

O. Install reinforced hypalon flashing around all new sheet metal scuppers.

P. Elastomeric Flashing:

1. Adhere elastomeric sheeting completely to flashing surface, cant, and roofing with flashing adhesive. After application of adhesive, allow adhesive to remain open for 15 minutes minimum to flash off solvent prior to setting elastomeric sheeting into flashing adhesive.
2. Apply consistent pressure to entire surface of elastomeric sheeting using a steel hand roller to achieve full adhesion of the sheet to the flashing substrate. Ensure complete bond and continuity without wrinkles or voids.
3. Lap sheeting ends 4 inches. Fully heat weld flashing laps.
4. Elastomeric sheeting width: Sufficient to extend at least 6 inches beyond toe of cant onto new roof.
5. Seal vertical and horizontal edges of sheeting with reinforcing membrane embedded in a base course of flashing adhesive and a top course of Modified Asphalt Mastic.

Q. Hot air heat welding of Hypalon:
1. Wipe both sides of lap surfaces to be joined with toluene solvent.
2. Adjust welding equipment air temperature prior to start. Utilize steel roller or weighted wheel on automatic welding equipment to provide pressure on lap area during heat welding.
3. Maintain air nozzle temperature, nozzle speed, and lap pressure when joining laps together.
4. Test lap areas to assure proper bonding. Remove lap sample from the roof. When lap sample is cool, pull test lap apart. When torn, the reinforcing scrim should become exposed. Patch test areas with new Hypalon of the same color and style, using a minimum 2" lap area.

R. On curb details, plies will extend 2" above cants. Reinforced Hypalon Sheeting will be set in Sheeting Bond and nailed inside wood nailer 6" on center. The outside edge of Hypalon Sheet will be 3-coursed with webbing and roof elastomeric mastic. Flashing seams shall be with heat seaming or Lap Adhesive. All Seams shall be cleaned prior to seaming with heat or adhesive with an approved Hypalon Solvent. Seal seams with Tremseal S Sealant. Install TF-Tape to both sides of the hypalon flashing.

S. On wall details, plies will extend 2" above cants. Reinforced hypalon sheeting will be set in butyl-based adhesive or Sheeting Bond onto roof surface 6" and up wall under flashing metal and fastened to nailer 12" on center. The outside edges of the plies of sheeting will be 3-coursed with webbing and roof elastomer. All Seams shall be cleaned prior to seaming with heat or adhesive with an approved Hypalon Solvent. Seal all lap seams with Tremseal S Sealant. Install TF-Tape to both sides of the hypalon flashing.

3.7 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect or Owner.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements. Make sure all drains .are free flowing.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction. Coat all projections, foot marks, or bleed through with specified white on white adhesive.

3.9 SCHEDULE OF SPECIAL WARRANTIES AND SERVICE AGREEMENTS

A. The following documents are referenced in this Section and are attached following this Section; complete and submit documents in accordance with requirements:

1. Roofing Installer's Warranty, Two Years.
2. Manufacturers QA Plus labor and material warranty, Fifteen Years.

END OF SECTION

SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Sheet metal flashings in connection with roofing.
2. Reglet and counter flashing assemblies.
3. Miscellaneous metal flashing and counter flashing as required, except where provided under Division 23 or Division 26.
4. Coping caps.
5. Gravel stops and metal edging.
6. Gutters and downspouts.
8. Splash pans where downspouts empty onto roofing.
7. Conductor heads.
8. Drip flashings.
9. Sheet metal wall coverings.
10. Roof pipe flashings.
11. Roof expansion joint covers.
12. Metal louvers not specified in Division 23.
13. Other sheet metal items, not necessarily specified herein or in other sections, but required to prevent penetration of water into building.

C. Related Sections:

1. Section 07 51 13: Built-Up Asphalt Roofing
2. Section 07 92 00: Joint Sealants.
3. Section 08 41 13: Aluminum Windows, Door & Frames
4. Section 09 24 00: Portland Cement Plaster
5. Division 23: Mechanical.
6. Division 26: Electrical.

1.02 SUBMITTALS

A. Shop Drawings: Submit for fabricated sheet metal indicating shapes, details, methods of joining, anchoring and fastening, thicknesses and gages of metals, concealed reinforcement, expansion joint details, sections, and profiles.

B. Samples: Submit Samples for materials or assemblies as requested.

C. Product Data: Submit brochures of manufactured items.

1.03 QUALITY ASSURANCE

A. Drawings and requirements specified govern. Provide the Work of this section in conformance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.

B. Materials shall conform to following standards:

1. ASTM A 167 - Stainless and Heat-Resisting Crhomium-Nicket Steel Plate, Sheet and Strip.

2. ASTM A 653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM B 370 - Copper Sheet and Strip for Building Construction.

4. ASTM B 749 - Lead and Lead Alloy Sheet, Strip and Plate Products.

C. Pre-installation Meetings: Refer to Division 7 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

1.04 DELIVERY, STORAGE AND HANDLING

A. Do not install bent and/or otherwise damaged materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized Sheet Steel: ASTM A 653, coating designation G90, hot-dip galvanized.

B. Copper Plate, Sheet and Strip: ASTM B 370, cold-rolled, tempered. Copper sheet and strip shall be cold-rolled-temper.

C. Sheet Lead: ASTM B 749, Type L50049 or L51121, weighing not less than 4 pounds per square foot.

D. Stainless Steel: Plate, sheet and strip shall conform to ASTM A 167, Type 304 or Type 316, No. 4 finish on exposed surfaces and No. 2 finish on concealed surfaces unless otherwise specified or indicated. Furnish Type 304 for general applications and Type 316 where exposed to acidic or alkaline conditions.

E. Fastenings:

1. Galvanized Steel: Nails, rivets, and other fastenings furnished in connection with galvanized sheet steel Work shall be sealed with rust resistive coating. Rivets shall be tinned. Nails and other fastenings shall be zinc-coated.

2. Copper: Nails, rivets, and other fastenings furnished in connection with copper sheet metal Work, shall be manufactured from hard-temper copper or hard brass.

3. Stainless Steel: Nails, rivets and other fastenings furnished in connection with stainless steel Work, shall be 300 series alloy to match alloy of stainless steel being fastened.

F. Soldering Flux: Raw muriatic acid for galvanized steel; rosin for tin, lead and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.

G. Solder: ASTM B 32, Grade 50A. Name of product manufacturer and grade designation shall be stamped or cast onto each bar.

2.02 FABRICATION

A. General:

1. Accurately form sheet metal Work to dimensions and shapes indicated and required. Cope finish molded and brake metal shapes with true, straight, sharp lines and angles and, where intersecting each other, to a precise fit. Unless otherwise specified, all galvanized sheet steel shall be 22 gage. Exposed edges of sheet metal shall have a 1/2 inch minimum hemmed edge.

2. Soldering of sheet steel or copper shall be performed with well-heated copper soldering iron or soldering torch, joints full flowing, neat and consistent. Thoroughly clean materials at joints before soldering, and tin coppers before soldering. Exposed soldering on finished surfaces shall be scraped smooth. Lock seam Work shall be fabricated flat and true to line and soldered along its entire length. Acid-fluxed Work shall be neutralized after fabrication.

3. Form and install sheet metal Work to provide proper allowances for expansion and contraction, without causing undue stresses in any part of completed Work. Installation shall be water and weathertight.

B. Gutters and Downspouts:

1. Gutters: Fabricate from 22 gage galvanized steel to match existing size and design unless otherwise indicated. Drain gutter towards nearest downspout and provide an expansion joint at mid-point between downspout outlets, but not to exceed 50 feet on center. Gutters shall not pond water. Rivet joints and ends with a minimum of 6 rivets per joint or maximum rivet spacing not to exceed 1-1/2 inch on center. Sweat solder from inside of gutter and in horizontal position where possible. Neatly fit downspouts to gutter using a slip joint. Provide expansion joints, consisting of 3 inch lap joints at not over 30 feet.

2. Form and install sheet metal Work to provide allowance for expansion and contraction without causing undue stresses in the completed Work.

3. Downspouts: Fabricate downspouts from 3 inch round, or 3 inch by 4 inch rectangular shapes, 16 gage steel tubing with butt joints and mitered elbows, sized as indicated. Downspouts exceeding 30 feet in length may be fabricated with a slip joint or leader head. Downspout shall be fabricated with elbows at bottom discharge or connected to drains as indicated. Joints, except expansion joints shall be sealed with a continuous weld. Galvanize downspouts after fabrication.

4. Outlets: Fabricate outlets of 22 gage galvanized sheet steel with a 1/4 inch rolled flanged soldered continuously to gutter. Outside diameter shall be 1/8 inch less than the diameter of the downspout and extend into downspout 3 inches. Install a 1/4 inch galvanized rod over center of outlet opening, lapping 1 inch over each side of outlet and soldered in place. Galvanize rod after fabrication, before installation.

C. Conductor Heads:

1. Fabricate conductor heads and outlets from 22 gage galvanized sheet steel. Cover tops of the conductor heads with 22 gage galvanized 1/4 inch wire mesh soldered securely to separately fabricated frame and mechanically fastened to top conductor head with a minimum of 2 fasteners.

D. Gravel Stops: Provide 24 gage galvanized sheet steel gravel stops wherever roof area drops to a lower level; at the eaves and rake of roof, where roof comes to an abrupt edge, and where indicated. Stops shall be of height indicated and shall be fabricated with 2 flanges. Horizontal flange shall be not less than 4 inches wide, and vertical flange shall extend down over vertical surfaces of trim or gutter. Gravel stops shall lap 4 inches at ends and corners, and shall be fabricated by notching and interlocking vertical face flanges. Contact surfaces of lapped flanges, including raised areas, vertical face and corners, shall be completely covered with flashing compound. Fabricate lap joints so that they will be in the direction of water flow. Where flanges are over 5 inches wide, provide 20 gage continuous cleats fastened at 24 inches on center.

E. Overflow Outlets: Provide galvanized sheet steel overflow outlets at locations and of sizes indicated. Outlets shall extend through full thickness of wall in one continuous piece and completely line the opening. On outside face of wall, top and sides of outlet shall finish 1/2 inch on surface of wall. Bottom of outlet shall project 1-1/2 inch beyond face of wall, and shall be bent down slightly. Outlets shall be sealed on the surface of the building. On inside face, side and bottom flanges shall extend not less than 8 inches beyond edge of opening, and not less than 6 inches at top. Outlets shall be installed at time roof is being installed.

F. Reglet Type Counterflashing: Where roof comes in contact with vertical surfaces, provide counterflashing. Set top of counterflashing 8 inches above roof deck unless otherwise indicated, and extend down at least 5 inches or to top of cant strip. Counterflashing and reglet shall be 22 gage galvanized sheet steel. Lap counterflashing and reglet 3 inches minimum at splices and miter at angles, or supply special metal corner fittings. Reglet and method of securing flashing shall be so constructed that flashing is firmly locked in place, but may be readily removed for replacement.

G. Splash Pans: Provide splash pans for all downspouts, which empty onto lower roofs. Pans shall be galvanized sheet steel 12 inches by 18 inches, unless otherwise indicated, and turned up 2 inches on at least 3 sides.

H. Roof Expansion Joint Covers: Fabricate of 22 gage galvanized sheet steel, as detailed. One side of joint shall be zee shaped, with 3 inch standing leg extended over the joint and turned down. The other side shall be box shaped, fabricated to extend over the joint, over the standing leg, and turn down to form a water barrier. Prefabricated bellows type joint covers are not permitted.

I. Louvers, Fixed: For sizes 2' x 3' maximum (Provide heavier gages as required for sizes indicated on Drawings).

1. Gages: #22 gage for spans to 24", #20 gage for spans to 36".

2. Type: Similar to SMACNA Plates #102, #103A-2 frame, #103D-1 louvers, folded U-frame Plate #108B

a. Insect Screen: 8 mesh with #27 gage galvanized wire

J. Miscellaneous Flashing: Unless otherwise indicated, miscellaneous flashing shall be fabricated of galvanized steel. Exterior doors and windows, unless covered by overhangs shall be provided with 22 gage galvanized steel drip flashing as detailed. At wood construction, nail flashing to framing before paper backed lath is installed.

K. Sheet Metal Roofing at Outside Storage Units: Cover outside storage unit roof with #26 gage galvanized sheet steel as indicated. Turn metal under edge at top, hem 1/2 inch, and secure with countersunk, flathead wood screws, spaced at 12 inches on centers.

L. Sheet Metal Wall Covering: Wall surfaces, where indicated, shall be covered with sheet metal to height indicated. Metal covering shall be 24 gage galvanized sheet steel, with joints between sheets occurring only over studs. Joints locked together and rolled flat. Exposed edges of sheet metal shall be hemmed at least 1/2 inch. Nail sheets in field along studding at 12 inches on center, and at top and bottom edges and seams at 4 inches on center, using 3d galvanized nails.

M. Roof Pipe Flashings: Provide welded seam 4 pound lead flashings. Field fabricated flashings shall also be welded.

PART 3 - EXECUTION

3.01 PREPARATION

A. Concrete and masonry materials in contact with sheet metal shall be painted with alkali resistant coating, such as heavy-bodied bituminous paint. Wood in contact with sheet metal shall be painted with 2 coats of aluminum paint or one coat of heavy-bodied bituminous paint.

3.02 INSTALLATION

A. General: Coordinate with installation of underlayment indicated in the Drawings and specified in Section 09220.

B. Gutters and Downspouts:

1. Anchor gutters to structure with 10 gage steel straps, galvanized after fabricating. Secure straps with galvanized fasteners at 3 feet on center. Drill pilot holes and use 12 x 2 inch pan head screws.

2. Install 1/4 inch galvanized wire mesh continuous cover on gutter where indicated.

3. Secure downspouts to walls with 1/8 inch x 2 inch galvanized steel straps. Straps shall be located at top, bottom, and at not over 10 feet on center. Block downspouts out 1/2 inch from the finish wall surfaces. Secure straps to wall framing with 1/4 inch by 2 inch long galvanized anchors. Expansion type anchors shall be provided when anchoring to concrete and masonry. Provide toggle bolts for attachment to masonry or plaster. At steel columns, provide fasteners as indicated. Plastic anchors are not permitted.

4. Anchor conductor heads to walls with 1/4 inch x 2-1/2 inch galvanized lag screws or 1/4 inch expansion type anchors.

C. Reglets: Install reglets at constant height above cant or as indicated. Provide minimum 3 inch lap at end splices of reglets. Caulk laps solidly.

D. Counterflashing:

1. Install at constant horizontal elevation across roof slope and slope at constant height above cant or as indicated.

2. Provide minimum 3 inch lap at all end splices of counterflashing.

E. Galvanized sheet steel parapet coping and flashing shall be continuous over top of parapet to form a watertight cap, with waterproof seams at approximately 10 feet on center, or as indicated. Anchor coping to outside of wall with a continuous cleat face nailed at 24 inch centers. Coping shall be fastened on inside wall with hex head screws and bonded sealing washers through oversized holes in the back of the coping. Corners and angles shall be lapped and soldered; do not install joint sealant.

F. Prefabricated Louvers: Install plumb and level; securely anchor; seal watertight to adjoining construction. Install screens, cranks, and blackout plates where required.

3.03 TESTING

A. Perform field water testing to demonstrate installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 71 00

ROOF SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Roof hatches.

C. Related Sections:

1. Section 05 30 00: Metal Decking.

2. Section 05 41 00: Load-Bearing Metal Studs.

5. Section 07 51 13: Built-up Asphalt Roofing

6. Section 07 60 00: Flashing and Sheet Metal.

1.02 SUBMITTALS

A. Shop Drawings: Submit for fabricated sheet metal indicating details, methods of joining, anchoring and fastening, thicknesses and gauges of metals, concealed reinforcement, sections, and profiles.

B. Samples: Submit Samples for materials or assemblies as requested. Provide finish Samples of exposed items.

C. Product Data: Submit brochures of manufactured items.

D. Installation Instructions: Provide manufacturer's recommended installation methods and instructions for each item. Instructions shall be prepared to indicate exact conditions of roofing, structure and adjoining construction.

1.03 QUALITY ASSURANCE

A. Drawings and requirements specified govern. Provide the Work in accordance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.

B. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar sheet metal specialties on roofing systems similar to the roofing systems specified.

C. Coordinate opening sizes and installation with roofing and related Work to ensure fit and installation.

D. Pre-installation Meetings: Refer to Division 7 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect roof specialties and accessories by storing above grade on required skids or supports. Protect from physical damage and do not install bent and/or damaged materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Roof Hatches:

1. Babcock Davis.

2. Bilco Company.

3. Lane-aire Model CRH.

4. Dur-Red Products.

2.02 PRODUCTS

NOTE TO PROJECT ARCHITECT: Drawings must indicate location and size of roof hatches and type, size, and location of ventilators and curbs.

A. Roof Hatches: Provide roof hatches of indicated sizes. Hatches shall be fabricated of galvanized steel, 14 gage curb and cover, 22 gage cover liner, and 1 inch thick insulation in cover and curb. Cover shall operate by a compression spring enclosed in a telescopic case or enclosed torsion spring, with automatic hold-open arm. Provide padlock hasp on inside of unit.

1. Accessories: Provide manufacturers fixed hatch railing system, providing a permanent means of fall protection for roof hatch openings. Rail system shall meet OSHA Standard 29 CFR 1910.23

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrate to receive roofing accessories and associated Work and conditions under which accessories will be installed. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install roof accessories in accordance with SMACNA and manufacturer's recommendations as required.

3.03 FIELD QUALITY CONTROL

A. Upon request of the IOR, perform field water testing to demonstrate that installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 84 00

FIRE STOPS AND SMOKE SEALS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

2. Mineral fiber insulation, fire safing, and safing edge of floor slabs and curtain walls.

3. Damming material, clips, and closures.

4. Gaps between the top of walls and ceilings or roof assemblies.

5. Expansion joints in walls and floors.

6. Openings around structural members which penetrate floors or walls.

C. Related Sections:

1. Section 03 30 00: Cast-in-Place Concrete.

2. Section 04 82 00: Concrete Unit Masonry.

3. Section 07 21 00: Thermal Insulation.

4. Section 07 92 00: Joint Sealants.

5. Division 8: Doors, Windows and Frames

7. Section 09 29 00: Gypsum Board.

8. Division 23: Mechanical.

9. Division 26: Electrical.

10. Division 27: Low Voltage Systems.

1.02 REFERENCES

A. ASTM Standards:

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.

3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

4. ASTM E1399 – Standard Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Widths on Architectural Joint Systems.

5. ASTM E1966 – Standard Test Methods for Fire-Resistive Joint Systems.

B. Underwriters Laboratories, Inc.

1. UL 263 – Standard for Fire Tests of Building Construction and Materials.

2. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.

3. UL 1479 – Fire Tests of Through Penetration Firestops.

4. UL 2079 – Test for Fire Resistance of Building Joint Systems.

5. UL Fire Resistance Directory.

C. Intertek Testing Services:

1. Intertek - Certification Listings.

D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

E. California Building Code, Chapter 7 Fire Tests of Through-Penetration Fire Stops.

1.03 SYSTEM DESCRIPTION

A. Provide fire stops and smoke seals to prevent the passage of fire, smoke, toxic gasses or water from one floor or area to another. Seal openings in floors, fire rated walls and permanent partitions penetrated by pipes, ducts, conduits and other items as shown, specified, and as required for the type of construction.

B. Mineral fiber insulation installed as fire safing at non-rated penetrations not containing pipes, ducts, conduits, and other items in floor slabs, wall partitions, construction-joint conditions between slabs and adjacent construction and where indicated or required.

C. Provide damming material, clips, and closures as required for support and containment of dams, and other insulation materials required for tested and rated fire stop systems.

1.04 QUALITY ASSURANCE

A. Performance Criteria:

1. Provide materials and Work to conform to source quality control criteria specified herein and CBC requirements in fire resistant wall and floor assemblies to prevent the passage of fire, smoke, and toxic gases.

2. Installed fire stops shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the floor, wall, or partition construction into which it is installed.

B. Comply with CBC requirements for fire rated construction.

C. Qualifications of Manufacturer: Products furnished for fire stopping and smoke seals shall be manufactured by a firm which has been continuously and regularly employed in the manufacture of these materials for a period of at least 5 years; and which can provide evidence of these materials being satisfactorily installed on at least 5 projects of similar size and type within such period.

D. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least 5 consecutive years; and can provide evidence of satisfactory completion of 5 projects of similar size and scope. Installer shall have applicators trained and certified by manufacturer for performing this Work.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

F. All products shall be approved by Owner's Office of Environmental Health and Safety (OEHS).

G. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

1. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

2. Adhesives and sealants shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.05 SUBMITTALS

A. Product Data:

1. Submit manufacturer's Product Data for each type of fire stop and smoke seal material proposed for installation. Indicate product characteristics, typical installations, performance, and limitation criteria and test data.

2. Submit manufacturer's printed installation instructions for each type of product, system, and construction required for the Work. Indicate fire resistance rating of each installation.

3. Submit fire test reports from independent testing agency indicating the following:

a Fire test report of fire stop material installed to substrate and penetration materials similar to the Work of this section. Test to indicate both Fire Resistance (F) and Temperature (T) Ratings.

b Test reports of products to be installed shall indicate conformance to ASTM E814, UL rating with UL classified system description, and UL classified system detail.

c. Test reports of products to be installed shall indicate conformance to systems included in the Intertek Directory.

B. Field Samples: No less than 10 days before commencing the Work of this section, provide field installed Samples of fire stop materials and systems.

1. Apply one Sample of fire stop material for each different penetration and related fire rating required for the Work.

2. Sample areas shall comply with thickness, fire resistance ratings, and finished appearance.

C. Manufacturer's Qualifications: Submit evidence of conformance with qualification requirements specified above.

D. Installer's Qualifications: Submit evidence of conformance with qualification requirements specified above.

E. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products to the Project site in manufacturer's original, unopened containers bearing correct UL labeling.

B. Fire stop material shall be stored above grade in an area protected from detrimental weather and moisture conditions and in compliance with manufacturer's requirements, including temperature restrictions.

C. Fire stop and seal materials shall be installed before expiration of shelf life.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Unless otherwise noted, products of this section shall be as manufactured by:

1. 3M Fire Protection Products.

2. Hilti, Inc.

3. Nelson Firestop Products..

4. Tremco, Inc.

5. Or Equal.

B. Provide materials and systems of specified manufacturers to suit penetration and substrate as determined by various conditions of installation.

C. Provide firestopping composed of components that are compatible with the substrates forming openings and the items penetrating the firestop, under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience.

2.02 MATERIALS

A. Cast-in Firestop Devices: Pre-installed firestop devices penetrating cast-in-place concrete decks and concrete over metal decks, for use with combustible and non-combustible pipe, (closed and open systems) insulated pipe, conduits and cable bundles. Provide metal deck adapters and top seal plugs.

1. 3M: Fire Barrier Cast-in-Place Devices.

2. Hilti: CP 653 Speed Sleeve; CP 680 Cast-in-Place FS Device; -

3. Tremco: CIPP Plastic, CIPP Metal.

4. Nelson Firestop Products

B. Firestop Collar: Made of galvanized steel housing and Intumescent inserts for firestopping combustible pipes through walls and floors. For use with concrete, masonry, wood floor and gypsum wall assemblies. Provide two collars on walls, one on each side, and one collar on underside of floors.

1. 3M: Plastic Pipe Device PPD.

2. Hilti: CP 643N and CP 644.

3. Tremco: TREMstop D.

4. Nelson Firestop Products: PCS Pipe Choke System.

C. Fire Block: Intumescent flexible block based on a two component foam, for use in walls and floors and concrete, masonry and gypsum wall assemblies. For large openings containing multiple penetrations: wall openings up to 48 inches by 48 inches and floors up to 36 inches by 36 inches.

1. 3M: Fire Barrier Self-Locking Pillow.

2. Hilti: FS 657.

3. Tremco: TREMstop PS1, TREMstop PS2.

4. Nelson Firestop Products: Fire Brick, Pillows.

D. Firestop Mortar: Fire-resistant mortar suitable for fireproofing large horizontal or vertical, concrete or masonry openings penetrated by single or multiple non-combustible pipes or cable trays.

1. 3M: Fire Barrier Mortar.

2. Hilti: CP 637.

3. Tremco: TREMstop Mortar.

4. Nelson Firestop Products: CMP Firestop Mortar.

E. Firestop Putty Stick: Intumescent, non-hardening, firestop putty for single or bundled cables and non-combustible pipe penetrations. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies.

1. 3M: MP + Stix.

2. Hilti: CP 618 and CP 619T.

3. Tremco: TREMstop MP Putty Stick.

4. Nelson Firestop Products: FSP AA445, AA439.

F. Firestop Putty Pad: Moldable firestop putty for protection of electrical outlet boxes.

1. 3M: MPP+.

2. Hilti: CP 617.

3. Tremco: TREMstop MP Putty Pad.

4. Nelson Firestop Products: FSP AA452, AA439..

G. Firestop Sealant: Smoke, gas and water resistant. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies.

1. Two or single component intumescent system for protection of combustible and non-combustible pipe, conduit and cable penetrations.

a) 3M: CP-25WB+, IC-15WB+, 3000WT.

b) Hilti: FS ONE.

c) Tremco: TREMstop IA+ or FyreCaulk.

d) Nelson Firestop Products: ES1399.

2. Silicone based system that provides maximum movement in fire-rated joint applications and pipe penetrations.

a) 3M: 2000+, 2000 NS.

b) Hilti: CP 601S.

c) Tremco: TREMstop Fyre-sil.

d) Nelson Firestop Products: CLK AA529, AA542, AA492.

3. Acrylic based system that provides movement capability in fire rated joints and seals through penetration applications.

a) 3M: FD 150+.

b) Hilti: CP 606.

c) Tremco: TREMstop Acrylic GG.

d) Nelson Firestop Products: FSC3.

4. Self-leveling silicone-based firestop sealant for use with through penetrations and construction floor joints.

   a) 3M: 1000 SL.

   b) Hilti: CP 604.

   c) Tremco: TREMstop Fyre-sil S.L.

   d) Nelson Firestop Products: CLK AA539, AA552.

H. Firestop Wrap Strip: Wrap strip of intumescent, flexible firestop for use with plastic and insulated pipe penetrations. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies.

1. 3M: Ultra GS, FS-195.

2. Hilti: CP 648-S, CP 648-E.

3. Tremco: TREMstop SuperStrip or TREMstop WS.

4. Nelson Firestop Products: MCT, MPS.

I. Spray: Sprayable or brush applied fire-rated mastic for construction joints where maximum movement is required. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies, at top of wall joints, curtain wall/slab edge and expansion joints.

1. 3M: FD 200.

2. Hilti: CP 672.

3. Tremco: TREMstop Acrylic SP spray.

4. Nelson Firestop Products: FSC3.

J. Metal Deck Strips and Plugs: Precut preformed mineral wool plugs and strips to fit flutes of metal deck profile and gap between top of wall and metal deck.

1. 3M: PM4.

2. Hilti: CP 777 Speed Plugs; CP 767 Speed Strips.

3. Tremco:

4. Nelson Firestop Products:

K. Fire Safing, Mineral Fiber or Ceramic Wool Non-Combustible Insulation:

1. Mineral Fiber: Density 4 pounds per cubic foot, USG Thermafiber, Fibrex "FBX Safing Insulation," or equal.

2. Ceramic Wool: Density 6 pounds per cubic foot, Johns Manville "Ceramic Fiber Insulation", Unifrax "Fiberfrax" ceramic fiber, or equal. Provide material in tested thickness for required hour rating.

   a. Flame Spread: Less than or equal to 25.

   b. Smoke developed: Less than or equal to 50.

3. For mineral fiber, provide 20 gage minimum size metal retainer clips and plates for fire safing support in vertical applications and in compliance with tested system design.

L. Supplemental Material: Provide supplementary materials required for complete, fire rated, installation.

2.03 SOURCE QUALITY CONTROL

A. Fire stop and smoke seal material shall be tested by an independent testing agency for conformance to Flame (F) and Temperature (T) requirements of ASTM E814/UL 1479.

B. Conform to UL Fire Hazard Classification Requirements. Material shall be classified as a fill, void, or cavity material and system for UL Through Penetration Firestop System.

C. Material shall be tested and shall display Flame Spread Index of 25 or less, and Smoke Developed Index of 450 or less when tested in accordance with ASTM E84.

PART 3 - EXECUTION

3.01 APPLICATION REQUIREMENTS

A. Provide single component fire stop sealant or putty:

1. Within penetrations subject to movement including conduit, cable bundles, buss duct, and noncombustible pipe.

2. As a sealant or caulking for smoke barrier construction, fire, and smoke dampers, mechanical/electrical framed elements in masonry and gypsum board partition systems, and other conditions.

B. Provide mineral fiber insulation for fire safing at joints and openings through floor slabs, walls, and partitions not indicated to be grouted, gaskets, sealed or otherwise made sound or air tight in this or other sections. Fire safing shall be packed and wedged solidly from both sides of walls and partitions, and from both top and bottom sides of slabs with noncombustible mineral fiber insulation.

3.02 PREPARATION

A. Examine the areas and conditions where fire stops and smoke seals are to be installed for conditions detrimental to the proper completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected for rated fire protection.

B. Surface to receive fire stops or smoke seals shall be free of dirt, dust, grease, form release agents, or other matter that would impair the bond of the fire stop material to the substrate or penetrating items. Substrate shall be frost free and when required, dry.

C. Voids and cracks in substrate shall be filled and unnecessary projections removed before installation of fire stops.

D. Penetrating items shall be permanently installed before fire stop and smoke seal installation.

E. Assure that all pipes, conduit, cable, and other items, which penetrate fire rated construction, have been permanently installed before installation of fire stops. Schedule and sequence the Work to assure that partitions and other construction, which would conceal penetrations, are not installed before the installation of fire stops and smoke seals.

F. Comply with manufacturer's recommendations for temperature and humidity conditions before, during, and after installation of fire stops and smoke seals.

3.03 INSTALLATION

A. General: Provide installation in accordance with manufacturer's installation procedures, as required. Install fire stops in accordance with fire test reports, UL Fire Resistance Directory, Intertek Testing Services Directory or SpecDirect, and reviewed Sample installations.

B. Dam Construction:

1. Install dams when required to properly contain fire stopping materials within openings and as required to achieve fire resistance rating as tested and rated.

2. Provide in conformance with installation requirements for type of floor, wall, and partition construction, and as recommended by fire stop manufacturer.

3. Combustible damming material shall be removed after appropriate curing. Noncombustible damming material may be left as a permanent component of the fire stop system.

4. Placement of dams shall not interfere with function, or adversely affect the appearance, of adjacent construction.

C. Installation of Single Component Fire Stop Sealant:

1. Provide noncombustible insulation as required to achieve fire resistance rating.

2. Install with manual or powered caulking gun. For up to 3 hour rating, install to the thickness required by the Listed System Designs as directed for wall and floor applications.

3. Surface of gun grade fire stop sealant shall be tooled with clean potable water.

4. Remove excess materials from adjacent surfaces within 10 minutes, with either water or other material compatible with sealant and recommended by sealant manufacturer, leaving the Work in a neat, clean condition.

D. Installation of Cementitious Fire Stop Mortar:

1. Mixing: Add dry powder to water and mix with mechanical mixer or hand mixing tools. Ratio and duration of mix shall be as instructed by fire stop mortar manufacturer. Average wet density of mortar shall be 70 pounds per cubic foot (+/- 5).

2. Wet surfaces before installation of fire stop mortar. Mortar may be hand installed or pumped into the opening.

3. When installing around layered and/or grouped cables, vibrate or move the cables slightly to prevent voids from forming between the cables.

4. Exposed surfaces shall be finished with conventional plastering tools before curing.

5. Allow at least 48 hours for initial cure before form removal. For full cure allow 27 days.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Repair damaged areas and restore integrity of assembly.

C. Keep areas of work accessible until inspection by authorities having jurisdiction.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

A. Clean surfaces adjacent to sealed openings and joints and remove excess of firestopping materials.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Joint sealants as indicated or required.

C. Related Sections:

1. Section 07 60 00: Flashing and Sheet Metal.

2. Section 07 84 0: Fire Stops and Smoke Seals.

3. Section 08 11 13: Hollow Metal Doors, Windows and Frames.

4. Section 08 41 13: Aluminum Windows, Doors and Frames.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating sealant joint locations, with full-size sealant joint details.

B. Product Data: Submit manufacturer's literature for each sealant material.

C. Material Samples: Submit Samples indicating color range available for each sealant material intended for installation in exposed locations.

D. Certifications: Submit manufacturer's certification materials comply with requirements specified.

E. Site Samples: At locations required, provide a Sample of sealant for each typical installation, approximately 24" long, including joint preparation, backing, sealant and tooling. Allow backing to extend 6" beyond end of sealant for inspection of substrate.

F. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C 794 for each substrate.

G. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants

1.03 QUALITY ASSURANCE

A. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least 5 consecutive years; and can show evidence of satisfactory completion of 5 projects of similar size and scope. Installer shall have applicators trained and approved by manufacturer for performing this Work.

B. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

1. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

2. Adhesives and sealants shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store in accordance with manufacturer's recommendations. Provide a uniform ambient temperature between 60 and 80 degrees F.

1.05 WARRANTY

A. Manufacturer shall provide a 5 year material warranty.

B. Installer shall provide a 2 year labor warranty.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish sealants meeting following in-service requirements:

1. Normal curing schedules are permitted.

2. Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required.

B. Furnish the products of only one manufacturer unless otherwise required, sealant colors as selected to match the adjoining surfaces.

2.02 MATERIALS

A. Sealants:

1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C 834, Type S, Grade NS, formulated to be paintable.

   a. Tremco Inc., Acrylic Latex Caulk.

   b. Bostik Construction Products Division, Chem-Calk 600.

   c. Pecora Corporation, AC-20.

2. Sealant 2: Butyl sealant, one-part, non-sag solvent-release-curing sealant complying with FS TT-S-001657 for Type 1 and formulated with a minimum of 75 percent solids.

   a. Tremco Inc., Tremco Butyl Sealant.

   b. Bostik Construction Products Division, Chem-Calk 300.

   c. Pecora Corp., BC-158.

3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25.

   a. Dow Corning Corp., Dow Corning 790, 791, 795.

   b. General Electric Co., Silpruf.

   c. Tremco, Inc., Spectrem 1.

   d. Pecora Corp., 864.

4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C 920, Type S, Grade NS, Class 25.

   a. Dow Corning Corp., Dow Corning 786.

   b. General Electric Co., Sanitary 1700.

   c. Tremco, Inc., Proglaze White.

   d. Pecora Corp. 863 White.

5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C 920, Type S, Grade NS, Class 25.

   a. Bostik Construction Products Div., Chem-Calk 900.

   b. Mameco International, Inc., Vulkem 116.

   c. Tremco, Inc., Dymonic.

d. Sika Corporation, Sikaflex 1-A.

6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C 920, Type M, Grade P, Class 25.

a. Tremco, Inc., HPL.

b. Mameco International, Inc., Vulkem 255.

c. Sika Corporation, Sikaflex 2C NS/SL.

d. W.R. Meadows, Pourthane.

7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D 217.

a. Pecora Corp., BA-98 Acoustical Sealant.

b. Tremco, Inc., Tremco Acoustical Sealant.

c. United States Gypsum Co., Sheetrock Acoustical Sealant.

B. Penetrations Through Fire Barriers: Refer to Section 07840: Fire Stops and Smoke Seals.

1. 3M Brand Fire Barrier Calk CP-25.

2. 3M Brand Fire Barrier Putty 303.

C. Joint Backing: ASTM D 1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.

D. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.

E. Lacquer sealer shall be clear, as recommended by sealant manufacturer.

F. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.

G. Sealants shall have normal curing schedules, shall be nonstaining, color fast and shall resist deterioration due to ultraviolet radiation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that joint openings are ready to receive Work and field tolerances are within the guidelines recommended by sealant manufacturer.

3.02 SURFACE PREPARATION

A. Joints and spaces to be sealed shall be completely cleaned of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect caulking Work. Where necessary, degrease with an solvent or commercial degreasing agent. Surfaces shall be thoroughly dry before application of sealants.

B. If recommended by manufacturer, remove paint and other protective coatings from surfaces to be calked before priming and installation of sealants.

C. Preparation of surfaces to receive sealant shall conform to the sealant manufacturer's specifications. Provide air pressure or other methods to achieve required results. Provide masking tape to keep sealants off surfaces that will be exposed in finished Work.

D. Etch concrete or masonry surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.

E. Perform preparation in accordance with ASTM C 804 for solvent release sealants, and ASTM C 962 for elastomeric sealants.

F. Protect elements surrounding Work of this section from damage or disfiguration.

3.03 SEALANT APPLICATION SCHEDULE

	Location	Type	Color
A.	Exterior & Interior joints in horizontal surfaces of concrete; between metal & concrete masonry and mortar.	Sealant 6	To match adjacent material
B.	Exterior door, entrance & window frames. Exterior & interior vertical joints in concrete & masonry metal flashing.	Sealant 3 or 5	To match adjacent material
C.	Joints within glazed curtain wall system. Skylight framing system. Aluminum entrance system glass and glazing.	Sealant 3	Translucent or Black
D.	Interior joints in ceramic tile and at plumbing fixtures.	Sealant 4	Translucent or White
E.	Under thresholds.	Sealant 2	Black

F.	All interior joints not otherwise scheduled	Sealant 1	ToMatch Adjacent Surfaces
G.	Heads and sills, perimeters of frames and other openings in insulated partitions	Sealant 7	Match Adjacent Surfaces

3.04 APPLICATION

A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and/or waterproofing.

B. Sealants shall be installed by experienced mechanics using specified materials and proper tools. Preparatory Work (cleaning, etc.) and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.

C. Concrete, masonry, and other porous surfaces, and any other surfaces if recommended by manufacturer, shall be primed before installing sealants. Primer shall be installed with a brush that will reach all parts of joints to be filled with sealant.

D. Sealants shall be stored and installed at temperatures as recommended by manufacturer. Sealants shall not be installed when they become too jelled to be discharged in a continuous flow from gun. Modification of sealants by addition of liquids, solvents, or powders is not permitted.

E. Sealants shall be installed with guns furnished with proper size nozzles. Sufficient pressure shall be furnished to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where gun installation is impracticable, suitable hand tools shall be provided.

F. Sealed joints shall be neatly pointed on flush surfaces with beading tool, and internal corners with a special tool. Excess material shall be cleanly removed. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Sealing shall be complete before final coats of paint are installed.

G. Comply with sealant manufacturer's printed instructions except where more stringent requirements are indicated on Drawings or specified.

H. Partially fill joints with joint backing material, furnishing only compatible materials, until joint depth does not exceed 1/2 inch joint width. Minimum joint width for metal to metal joints shall be 1/4 inch. Joint depth, shall be not less than 1/4 inch and not greater than 1/2 inch.

I. Install sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as indicated. Install non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic.

J. Where joint depth prevents installation of standard bond breaker backing rod, furnish non-adhering tape covering to prevent bonding of sealant to back of joint. Under no circumstances shall sealant depth exceed 1/2 inch maximum, unless specifically indicated on Drawings.

K. Prime porous surfaces after cleaning. Pack joints deeper than 3/4 inch with joint backing to within 3/4 inch of surface. Completely fill joints and spaces with gun applied compound, forming a neat, smooth bead.

3.05 MISCELLANEOUS WORK

A. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to Drawings for condition and related parts of Work.

B. Install sealants to depths as indicated or, if not indicated, as recommended by sealant manufacturer but within following general limitations:

1. For joints in concrete walks, slab and paving subject to traffic, fill joints to a depth equal to 75 percent of joint width, but not more than 3/4 inch deep or less than 3/8 inch deep, depending on joint width.

2. For building joints, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

3.06 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.07 CURING

A. Sealants shall cure in accordance with manufacturer's printed recommendations. Do not disturb seal until completely cured.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS, WINDOWS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Hollow metal doors and frames or hollow metal doors as indicated.

2. Hollow metal window frames or hollow metal door and window frames.

C. Related Sections:

1. Section 07 92 00: Joint Sealants.

2. Section 08 21 00: Wood Doors.

3. Section 08 71 00: Door Hardware.

4. Section 08 80 00: Glazing.

5. Section 09 91 00: Painting and Coating.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Door-and-frame assemblies or frames shall include all reinforcing and provisions for hardware as shown and specified. Drawings indicate profile and general details of steel frame fabrication and installation, in addition to referenced details 1, 2, 3 and 3A in this section.

1.03 SUBMITTALS

A. Shop Drawings: Submit composite Shop Drawings indicating detailed relationships of installation including Work of adjacent construction, finish hardware, security, fire and life safety devices, glazing, caulking, and requirements for field installation. Include elevations of each hollow metal door type, details of each frame type, location schedule of doors and frames indicating same reference for details and openings as indicated on Drawings, conditions of openings of various wall sections and materials, typical and special details of construction, methods of assembling sections, location and

installation requirements for hardware, material size, shape, and thickness, and all joints and connections.

B. Product Data: Submit manufacturer's Product Data indicating composition and construction for each fabricated item including louvers, coatings, finishes, and other components demonstrating compliance with referenced standards.

C. Certification: Submit certification of compliance with referenced standards and specified criteria, including but not limited to fire ratings in accordance with UL 10C, Physical Endurance in accordance with ANSI A250.4 and Prime Paint performance in accordance with ANSI A250.10..

D. Samples: Hollow Metal Frame: Corner section of typical exterior and interior frame, of sufficient composite size to illustrate corner joint construction, hinge reinforcement, closer re-enforcement, floor anchor, dust cover, and jamb anchors, and showing galvanizing and prime coat finishes..Hollow Metal Door: Section of typical interior door of sufficient composite size to illustrate edge, top, bottom, and core construction, hinge reinforcement and face stiffening, closer reinforcement and kick plate reinforcement, and corner of vision opening construction with glazing beads.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum documented experience of more than five years in work of this section.

B. Installer Qualifications: Minimum documented experience of more than five years in work of this section

C. Coordinate with hardware supplier for fabrication of doors and frames to receive hardware items.

D. Coordinate with intrusion alarm supplier for fabrication of doors and frames to receive intrusion detection devices.

E. References: Work shall comply with physical and performance requirements of following standards, including all standards referenced in them, except for more stringent provisions specified herein or required by regulatory agencies:

1. ANSI/SDI A250.8 - 2003, SDI 100 Recommended Specifications for Standard Steel Doors and Fames.

2. ANSI/NFPA 252, Fire Tests of Door Assemblies.

3. ANSI/UL 10B, Fire Tests of Door Assemblies.

4. ANSI/UL 10C, Positive-Pressure Fire Tests of Door Assemblies.

5. ANSI/NFPA 80, Fire Doors and Fire Windows

6. HMMA, Guide Specifications for Commercial Hollow Metal Doors & Frames (Standard of National Association of Architectural Metal Manufacturers).

7. ANSI/SDI A250.4, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings.

8. ANSI A250.10, Test Procedure and Acceptance Criteria for Prime Painted Steel Doors and Frames.

9. ANSI A250.6, Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.

F. Standards of Workmanship and Installation:

1. Finished Work shall be of uniform profile, accurately fabricated, rigid and strong, square and true, neat in appearance, smooth and free from dents, waves, warps, buckles, open joints, tool marks and/or other defects.

2. Steel sheet shall be clean with smooth surfaces free of scale, pitting or other defects.

3. Construction joints shall be flush, tight and welded their full length, ground flush and smooth on exposed surfaces.

4. All frame and door reinforcing and hardware provisions shall be performed in fabrication shop. Provide all cuts, welds, and other fabrications before galvanizing or shop priming.

5. Lines and molded members shall be straight and true with angles as sharp as practical for thickness involved, surfaces flat, and fastenings concealed.

1.05 DELIVERY, STORAGE AND HANDLING

A. Frames: Before shipment, install temporary spreaders at bottom of bucks and do not remove until frames are installed.

B. Doors: Provide protection as required to protect doors during shipping and storage. Damaged doors will be rejected.

C. Inspect hollow metal Work upon delivery for damage. Remove and replace damaged items with new Work as required.

D. Store doors and frames in an upright position at Project Site under cover and protected from weather-related elements. Store units on minimum 4" high wood blocking with ½" air spaces between stacked doors to provide circulation. Do not store doors and frames under plastic or canvas shelters that can create a humidity chamber. If shipping packaging becomes wet, immediately remove packaging.

1.06 WARRANTY

A. Manufacturer shall provide a 1 year material and workmanship warranty.

B. Installer shall provide a 2 year labor warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. All doors and frames shall be products of a single manufacturer.

B. The following are acceptable manufacturers, as are others that can demonstrate their products are equivalent in quality, performance and compliance with these specifications.

1. Security Metal Products Corp.

2. Curries Manufacturing, Inc.

3. Steelcraft.

4. Amweld Metal Doors and Frames.

5. Stiles Custom Metal, Inc.

6. Door Components Inc.

7. CECO Door.

C. All materials, fabrication and installation must comply with requirements of standards referenced in Section 1.04, Quality Assurance.

2.02 MATERIALS

A. Steel

1. Exterior Doors and Frames: Galvanized Carbon Sheet Steel, Commercial Quality, A60 zinc coating (0.30 ounces per square foot per side), ASTM A653.

2. Interior Doors and Frames: Cold-Rolled Steel Sheets, Commercial Quality Carbon Steel, ASTM A1008.

3. Steel shall be free of scale, pitting, coil breaks or other surface blemishes, and free of buckles, waves or other defects.

4. Steel thicknesses expressed in steel gages (MSG) is for reference only. Actual steel thicknesses must meet minimum requirements of ASTM standards and as described in ANSI/SDI A250.8.

B. Sound Deadening Core Insulation: Furnish rigid, unsettling, vermin-proof, and non-combustible fiberglass or rockwool type material to provide required STC and thermal ratings within door fabrications. Doors shall have a minimum sound transmission classification of 28 as tested under ASTM E90 and ASTM E413 unless noted otherwise.

C. Supports and Anchors: Fabricate from a minimum 16 gauge galvanized sheet steel unless noted otherwise.

D. Fasteners: Provide as shown on Drawings and to suit conditions of secure installations. Furnish 304 Grade stainless steel types at exterior doors.

E. Door Louvers:

1. Louver free air flow shall be 50% free area.

2. Louvers for exterior doors shall be galvanized and furnished with not less than 12 gage frame and security grille welded to 18 gage steel blades, fully galvanized, with removable galvanized or bronze insect screen on inside. Install louver with tamperproof-head through-bolts. Anemostat PLSL, Air Louvers Inc. Model 1500-A or equal.

3. Fusible link louvers: Listed by State Fire Marshal, UL labeled and installed with tamperproof fasteners.

4. Lightproof louvers (at dark rooms): DRDL by Anemostat, Air Louver Model 1000, or equal.

5. All louvers shall be furnished with factory primer.

F. Vision panels: Manufacturer's standard, U.L. approved, finished flush with door face, with no visible fasteners on either door face.

G. Shop Paint:

1. Conform to Steel Structures Painting Council (SSPC) for all steel components.

2. Pretreatment/priming coatings shall be compatible with Project site finish painting system in accordance with Section 09900.

3. At frames to be grouted, all surfaces that are inaccessible after installation shall be coated with bituminous or asphaltic base paint.

2.03 FABRICATION GENERAL

A. General: Fabricate hollow metal units to be rigid, neat in appearance, and free from defects including warp or buckle.

1. Accurately form metal to required sizes and profiles. Fit and assemble all units in manufacturer's plant. Where practical, factory or shop fit and assemble units for shipment.

2. Weld all joints continuously; grind, dress, and make smooth, flush, and invisible. Filler to conceal manufacturing defects or damage is not permitted.

3. Corner Joints: Finish corner joints by mitering, or coping and butting, or a combination of both. Trim and backbend shall be continuous around corner.

4. Continuously weld joints for full depth and width of frame, trim, and backbends.

5. Clearances for Fire-Rated Doors: As required by NFPA 80.

2.04 FRAMES

A. General: Provide fully welded steel frames with integral stops and trim for doors, transoms, sidelights, borrowed lights, and other openings, and with details indicated for type and profile. Use concealed fastenings, unless otherwise indicated.

B. Metal Thickness of Frames (minimum):

1. Interior hollow metal frames up to 4'-0" wide 16 gage

2. Interior hollow metal frames wider than 4'-0" 14 gage

3. Exterior hollow metal frames 14 gage

4. Borrowed lights up to 4'-0" wide 16 gage

C. Supports and Anchors: Fabricate from at least 16-gage, galvanized steel sheet. Frame anchors shall comply with fire rated label requirements of opening.

1. Floor Anchors:

a. Minimum thickness: 12 gage galvanized steel sheet or bent steel plate, securely fastened inside each jamb, with two holes in anchor at each jamb for 3/8" floor anchorage fasteners. For preframed wood stud walls provide and additional wood stud anchor located as close to the bottom of the jamb as is practical.

b. Where required at sloping and uneven floor conditions, or to coordinate adjustments for trim alignments, provide adjustable floor anchors, providing at least 2" height adjustments.

2. Jamb Anchors:

a. Locate anchors near top and bottom and at intermediate points not to exceed 24 inches on center. Provide 2 anchors per head for openings up to 48 inches wide; over 48 inches wide provide anchors at 24 inches on center maximum.

b. Anchors in masonry construction: Provide manufacturers standard jamb anchors. Steel wire complying with ASTM A510, 0.177 inch in diameter, may be furnished.

c. Anchors in Stud Partitions: Provide steel anchors, 16 gauge minimum sheet steel, of design to suit partition construction, securely welded inside each jamb.

d. Through-Frame Anchors: At frames indicated to be anchored with bolts through frame, provide countersunk holes for bolts with 16 gauge minimum sheet steel stiffeners full thickness of frame, and securely welded inside each frame at each hole.

D. Inserts, Bolts, and Fasteners: Provide manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A153 Class C or D as required.

E. Head Reinforcing: Refer to Detail #2 of this section. Reinforcing shall not act as lintel or load-carrying member and shall comply with fire rating requirements. Provide at all frames regardless of whether or not closer is called for.

F. Hardware Reinforcement and Accessories:

1. Butt Hinge: 7 gage minimum.

2. Continuous hinge: 14 gage continuous strip reinforcing.

3. Head assemblies: Reinforced internally with, full length, 10 gage angles on each side of frame and bar at bottom of stop for closer reinforcement in all frames as shown in Detail #2 of this section.

4. Reinforcing for other items of finish hardware shall be accomplished according to ANSI A250.6.

5. Plaster Guards: Provide 26 gage galvanized steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

G. Mullion and Transom bars: Furnished and fabricated as specified for frames.

H. Glazed Openings: Applied stops with mitered or butted corners, of minimum 18 gage galvanized steel, one-piece lengths, secured within 3" of ends and at 12" centers with oval head countersunk tamper resistant screws. Corner joints shall be furnished with contact edges closed tight, with trim faces mitered and continuously welded. Frames for multiple openings shall be provided with mullion and/or rail members, fabricated of closed tubular shapes with no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth. Provide condensate weeps 4 inches on centers, maximum.

I. Door Silencers: Except for exterior doors, drill and punch frames for three silencers at lock jamb of single swing doors or in double doors with astragal and one silencer per leaf in heads of doubled door frames.

J. Where frames are installed in walls sitting on a concrete curb, provide a closure plate or extend backbends to provide closure where frame abuts concrete curb.

2.05 DOORS

A. General: Custom-made, flush-panel "seamless type" with one-piece face panels; continuous weld, seamless edge construction with no visible seams or joints on faces or on vertical edges.

1. Provide type and size of doors shown with louvers and openings for glazing where indicated.

2. Minimum Door thickness: 1 ¾ inches.

3. Face Sheet Minimum Gage: 16 gage.

4. Stiffeners: Stiffen door face sheets with continuous vertical-formed steel (rib) sections or back to back hat sections, minimum 20 gage, full thickness of interior space between door faces, spaced 6" on center maximum, and spot welded to both faces 4" on center maximum.

5. Core Insulation: Provide sound deadening and insulating material through entire core of door (full height, width, and thickness of door). Provide STC ratings where indicated on Drawings, scheduled, or for partition ratings indicated on Drawings.

a. Doors, shall have a minimum sound transmission classification of 28 as tested under ASTM E90 and ASTM E413, unless noted otherwise..

b. Exterior doors shall meet or exceed required thermal rating indicated on Drawings, scheduled, or for wall rating.

6. Door Edges: Join door face sheets at vertical edges of door with continuous weld full height of door. Grind, fill, and dress welds smooth to provide invisible seam with smooth, flush surface.

a. Close ends of doors with continuous recessed channels, 16 gage steel minimum, spot welded to both face sheets. Close top and bottom edges of doors with a internal steel channel, screw attached into top and bottom of door. Channel shall be galvanized at exterior doors. No screws are allowed on visible faces of door. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.

b. Profile of Door Edges:

1.) Single-acting swing doors: Bevel both vertical edges 1/8" in 2".

2). Pairs of single-acting swing doors: Bevel hinge edge 1/8" in 2". Provide surface mounted astragals for labeled or unlabeled doors unless otherwise shown on Drawings or required.

3). Double-acting swing doors: Round both vertical edges on 2" minimum radius.

7. Door Louvers: Install according to manufacturers recommendations.

8. Glass Stops:

a. Furnish fixed stops integral with and welded at security side of door.

b. Finish: Factory primer.

9. Transom: Fabricate to requirements specified for flush doors.

10. Labeled Doors: Where fire-rated openings and conditions are indicated.

a. Labeled doors shall be provided with fire-resistance rating indicated and shall be constructed as tested and approved by Underwriters' Laboratories (U.L) for installation in labeled frame and door assemblies.

b. Gaskets: Gaskets are supplied under Section 08710 Door Hardware. Gaskets and installation shall conform to requirements of NFPA 105, "Installation of Smoke and Draft Control Door Assemblies."

c. Fabricate labeled doors with same finished appearance as specified for non-labeled hollow metal doors; with welded door edges, filled and ground smooth; with label affixed to door.

d. Where fire labels are required and continuous hinge is specified, install label on top of door within 6" of hinge side of door.

K. Hardware Reinforcement and Accessories:

1. Provide sheet steel or plate reinforcement for finish hardware items wherever necessary. Mortise, drill and tap to template requirements for mortise type hardware.

2. Butt reinforcing: 7 gage minimum, of length 4" longer than length of butt. Minimum 3 spot welds at top and bottom.

3. Door closer reinforcement: 14 gage minimum steel channel, 6" high on each side of door.,. Reinforcement to extend full width of door in accordance with Detail #1 of this section.

4. Other Hardware Requirements: Cut, reinforce, drill, and tap doors and frames for other hardware, including energy management switches or contacts and security devices, in accordance with furnished hardware templates for accessory items. Thickness and size of reinforcement shall be as required by ANSI A250.6.

2.06 SHOP PRIMING

A. All exposed and concealed metal surfaces of all hollow metal doors, frames and other hollow metal Work of this Section shall be bonderized and then shop primed.

B. Exposed surfaces of doors, frames and accessories shall be filled, sanded smooth and cleaned before painting.

C. All exposed surfaces shall be shop primed after assembly.

PART 3 - EXECUTION

3.01 FRAME INSTALLATION

A. Install steel frames accurately in location, perfect alignment, plumb, straight and true. Brace frames to prevent displacement.

B. Anchor frames in concrete and concrete unit masonry with galvanized anchor bolts; 3/8 inch diameter, counter-sunk at 24 inches on center at head and jamb unless noted otherwise.

C. Anchor frames in steel and wood frame partitions with manufacturer recommended anchors.

D. Install frame at fire rated openings in accordance with NFPA Standard No. 80.

E. Furnish filler for anchor attachment screws, and sand smooth.

3.02 DOOR INSTALLATION

A. Install steel doors in accordance with manufacturer's instructions and as indicated on Drawings and in Finish Hardware Specifications. Coordinate with Work of other trades.

B. Ensure that all door and jamb clearances comply with requirements of ANSI/NFPA 80. When wood doors are being installed in metal frames constructed pursuant to this section, allowable door and jamb clearances shall be as specified in Specification Section 08210.

C. Adjust operable parts for correct function.

D. Remove hardware, except primer-coated items, tag, box and install after finish painting has been completed.

3.03 PRIME COAT TOUCH-UP

A. Immediately after installation, remove rust, repair damaged surfaces to new condition, sand smooth, and install touch-up primer.

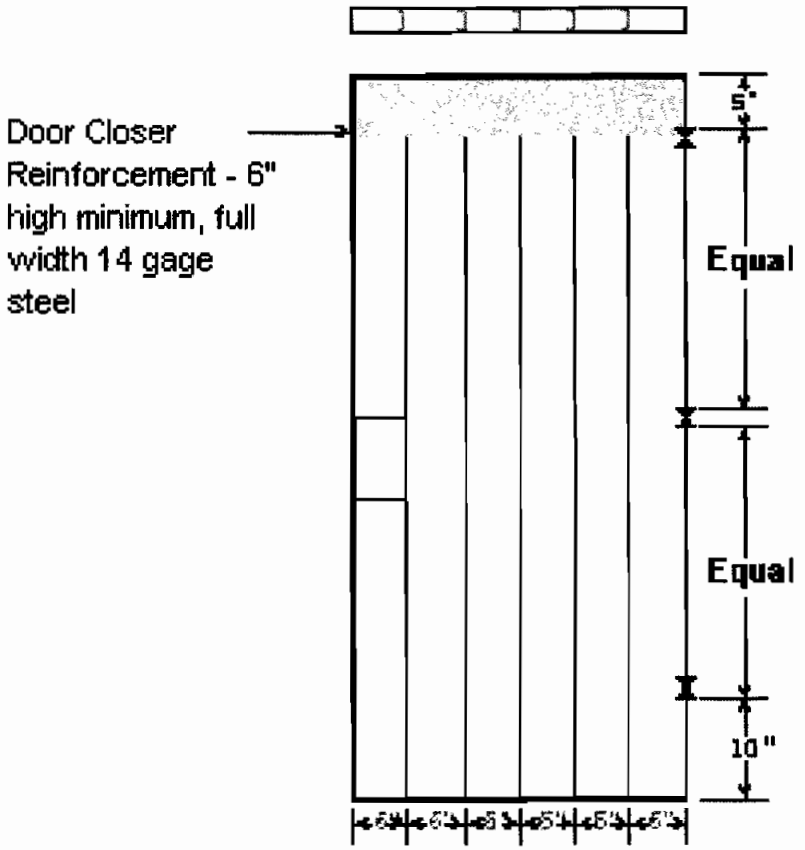
3.04 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

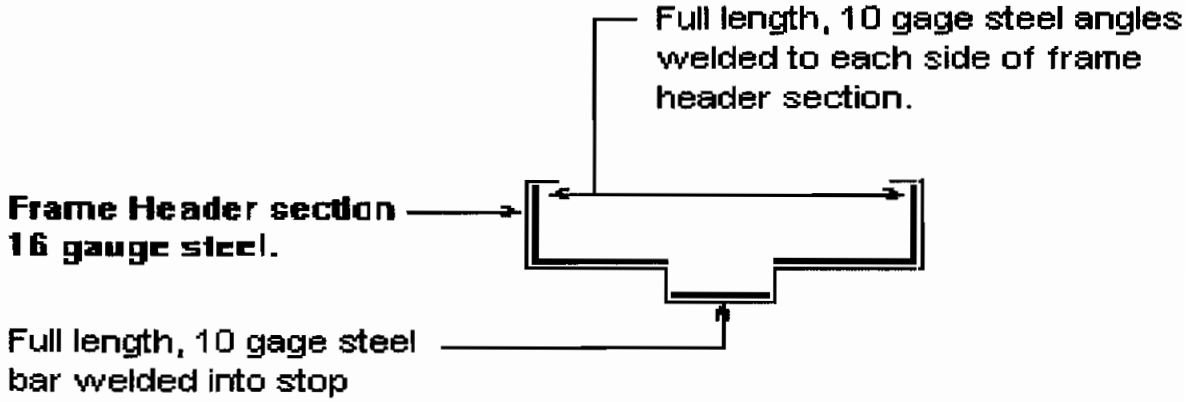
3.05 PROTECTION

A. Protect Work of this section until Substantial Completion.

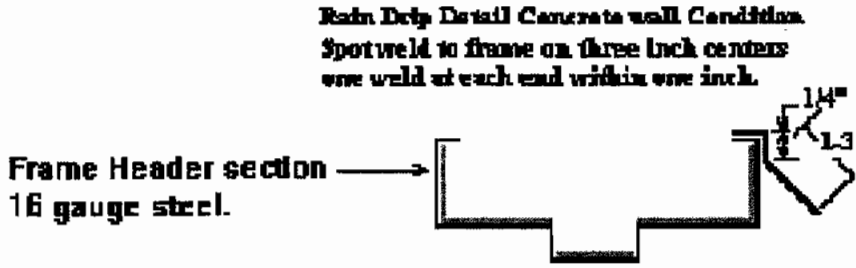
Detail # 1 - Door Hardware Reinforcement



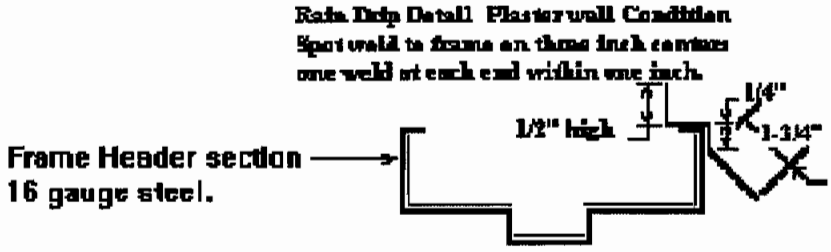
Detail # 2 - Frame Header Reinforcement
Door Closer reinforcement for all steel door frames.



Detail # 3 - Concrete Wall Condition Rain Drip
Detail fro Exterior Door where Rain Drip Required
Exterior Side with rain drip welded in place.



Detail # 3A
Plaster Wall Condition -
Detail for Exterior doors where rain drip is required.
Exterior side with rain drip welded in place.



END OF SECTION

SECTION 08 21 00

WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Wood doors.

C. Related Sections:

1. Section 08 11 13: Hollow Metal Doors, Windows and Frames

2. Section 08 71 00: Door Hardware.

3. Section 08 80 00: Glazing.

4. Section 09 91 00: Painting and Coating.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Drawings indicate sizes, locations and general details of wood door construction and installation.

B. Regulatory Requirements:

1. Fire rated doors shall be listed by a nationally recognized testing and certification agency in accordance with local building codes and acceptable to the authorities having jurisdiction. The listed doors shall meet or exceed the requirements of UL10B, NFPA 252 and NFPA 80. All door requiring fire-rating shall carry either a UL or ITS (Intertek Testing Services-Warnock Hersey) label.

2. Comply with CBC requirements. Provide products that have been tested and passed as an assembly in compliance with CBC Standard 7-2 positive pressure smoke testing requirements.

3. ASTM E 2074 – Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure on Side-Hinged and Pivoted Swinging Door Assemblies.

1.03 SUBMITTALS

A. Shop Drawings: Submit schedules, plans, elevations and details indicating door construction details, opening identification symbols, sizes, door type and grade,

fire classification, swing, light and louver cutout size and locations, and undercuts.

B. Product Data: Submit manufacturers technical data for each specified door type, including details of wood species, design and construction, factory finishing specifications and installation instructions.

C. Construction Samples: Submit 3 samples of not less than 6 inches by 6 inches for each type of door to be furnished, showing face, edge and core construction.

D. Color/finish Samples: Submit 3 samples of not less than 4 inches by 6 inches on representative door finish and 3 samples of 3 inches by 8 inches for the exposed edges. Each sample shall bear a label identifying the job name, Architect, Contractor and the Woodwork Insitute finish system number.

E. Certificates:

1. Submit Certificate that solid core fire doors comply with all requirements of ANSI/WDMA I.S. 1A-97..

2. Submit certification that doors comply with CBC 7-2 or UL 10B.

1.04 QUALITY ASSURANCE

A. Wood doors shall conform to industry standard and all requirements of the American National Standards Institute, Inc., the Window & Door Manufacturers Association's Architectural Wood Flush Door Section standard ANSI / WDMA I.S. 1A-97 including the latest revisions, and special requirements herein specified.

B. All doors shall be fabricated by the manufacturer to the dimensions specified.

C. Doors shall be products of one manufacturer.

D. Door modifications are not permitted, unless reviewed by the Architect.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturers original, unopened, undamaged containers with identification labels intact.

B. Deliver doors to the Project site only after building has been provided with design temperature and humidity.

C. Store and handle in accordance with ANSI / WDMA I.S.1A-97. Store doors protected from exposure to harmful conditions and at temperature and humidity conditions recommended by the manufacturer.

1.06 PROJECT CONDITIONS

A. Do not install doors until building is enclosed and ambient conditions are within the temperature and humidity range recommended by door manufacturer.

1.07 WARRANTY

A. Manufacturer shall provide a 2 year material warranty for exterior doors.

B. Manufacturer shall provide a life time material warranty for interior doors.

C. Installer shall provide a 2 year labor warranty for all doors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide products manufactured by one of the following:

1. Algoma Hardwood Inc.

2. Brentwood Manufacturing.

3. Eggers Industries.

4. Mohawk Flush Door, Inc.

5. Western Oregon Door.

2.02 DOOR CONSTRUCTION

A. Exterior Flush Doors:

1. Exterior doors shall be furnished as follows:

a. Transparent Finished (Stained): Custom Grade. Solid wood core flush veneered, 5 ply minimum, faced both sides with faced veneer, fully bonded to core.

b. Opaque Finished (Painted): Custom Grade. Solid wood core flush veneered, 5 ply, faced both sides with smooth resin fiber medium density overlay, bonded to core.

2. Staved Lumber Core shall be low density, thoroughly kiln-dried wood blocks not more than 2-1/2 inches wide, with joints staggered, and random lengths.

3. Edge strips: Shall be kiln-dried birch or maple

a. Transparent Finished Doors: Same species as face veneer or similar in overall color, grain, character and contrast as the face veneer.

b. Opaque Finished Doors: Closed grain hardwood.

4. Full stile edge strip shall be not less that 2 inches wide. Stiles shall be fully bonded to the core. The outer face stiles shall be full length ¾ inch birch or maple. The inner back stile shall be 1-1/4 inches, 2 ply of similar species which may have four finger joints well staggered or be full lengths.

5. Top rail shall be a minimum of 2 inches with a maximum of 3 plies. Bottom rail shall be a minimum of 5 inches with a maximum of 6 plies. The outer rail faces shall be full length 7/8 inch of same species as edge strips. The inner rails shall be full length of similar species. Rails shall be fully bonded to core.

6. Crossbanding: Doors shall be furnished with full width crossbanding of properly dried hardwood, 1/16 inch thick, with a density of 52 pounds or higher per cubic foot.

8. Face Veneer for Opaque Finished Doors: Custom grade "A" medium density overlay.

9. Adhesive and Bonding: Bonding between veneer plies of wood face panels, and between door faces, frame and core unit shall be fabricated with type I waterproof cross-linking emulsion PVA adhesive.

10. Openings: Openings for lights, louvers and grilles, shall be fabricated by manufacturer, or in a certified door service mill in accordance with manufacturer's details, and in compliance with approved testing agency.

11. Louvers:

a. Louvers for exterior doors shall be furnished with at least 12 gage frame and security grill welded to 18 gage steel blades, fully galvanized, with removable galvanized or bronze insect screen on inside. Install louver with tamperproof-head through-bolts: Anemostat PLSL, Air Louvers Inc. Model 1500-A, or equal.

b. Light-proof louvers (at Dark Rooms): Type DRDL by Anemostat, Air Louver Model 1000, or equal.

c. All louvers shall be furnished with factory primer.

12. Vision Panels: Vision panels in exterior doors shall be framed with Security Grille Glass Stop: Anemostat Sl-IS, Air Louvers Inc. VLF-SG, or equal. Install vision panels with tamperproof-head through bolts. Security Grille shall be supplied with manufacturer's standard baked-on enamel finish.

B. Interior Flush Doors:

1. Interior doors shall be furnished as follows:

a. Transparent Finished (Stained): Custom grade. Solid wood core flush veneered, 5 ply minimum, faced both sides with faced veneer, fully bonded to core.

b. Opaque Finished (Painted): Custom grade. Solid wood core flush veneered, 5 ply minimum, faced both sides with smooth resin fiber medium density overlay, fully bonded to core.

2. Staved Lumber Core shall be low density, thoroughly kiln-dried wood blocks not more than 2-1/2 inches wide, with joints staggered, and random lengths.

3. Edge strips: Kiln-dried birch, maple or other material as indicated.

a. Transparent Finished Doors: Same species as face veneer or similar in overall color, grain, character and contrast as the face veneer.

b. Opaque Finished Doors: Closed grain hardwood.

4. Full stile edge strip shall be not less that 1-1/2 inches wide, 2 ply stile. Stiles shall be fully bonded to the core. The outer face stile shall be full length ¾ inch birch or maple. The inner back stile shall be ¾ inch of similar species which may have two finger joints fully bonded to core.

5. Top and bottom edge rails shall be full length and may be of glued up stock of similar species as edge strip, white fir or douglas fir, minimum density 24.33 pounds or higher per cubic foot. Top rail shall be minimum of 2 inches. Bottom rail shall be minimum of 5 inches fully bonded to core.

6. Crossbanding: Doors shall be furnished with full width crossbanding of properly dried hardwood or engineered fiber composite material, 1/16 inch thick, with a density of 52 pounds or higher per cubic foot.

8. Face Veneer for Opaque Finished Doors: Custom grade "A" medium density overlay.

9. Adhesive and Bonding: Bonding between veneer plies of wood face panel, and between door faces, frame and core unit shall be fabricated with type I or II waterproof adhesives for interior doors.

10. Openings: Openings for lights, louvers and grilles shall be performed by the manufacturer, or in a certified door service mill in accordance with manufacturer's details, and in compliance with testing agency requirements.

11. Louvers:

a. Louvers for interior doors shall be furnished with at least 12 gauge cold rolled steel frames and security grill welded to 18 gauge blades: Anemostat PLSL, Air Louvers Inc. Model 1500-A, or equal.

b. For fire rated doors: Anemostat FLDL-UL-SG2, Air Louvers Inc. Model 1900-ASG, or equal.

c. Light Proof Louvers (at Dark Rooms): Anemostat Model DRDL, Air Louvers Inc. Model 1000, or equal.

d. Install louvers with tamperproof-head through bolts.

12. Vision Panels: Vision panels in fire labeled doors shall be framed with FGS-75 Fire Glass Stop by Anemostat, Air Louvers Inc. Model VLF, or equal and shall be State Fire Marshall listed. Frame shall be supplied with manufacturer's standard baked-on enamel finish. Install with tamperproof-head through bolts.

C. FireRated Doors:

1. All fire doors must meet the requirements of recognized fire door tests and bear certifying labels of an approved independent testing agency.

2. With exception to the requirements that would adversely affect the fire rating, rated doors shall meet the specifications listed in this section.

3. Door shall be constructed that when installed as an assembly and tested it will pass ASTM E-2074 "Standard Test Method for Fire Test of Door Assemblies Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies," and can be rated as required.

4. Reinforcement Blocking: Provide hardware reinforcement blocking of size as required to secure specified hardware. Reinforcement blocking shall be in compliance with the manufacturer's labeling requirements and shall not be of mineral material.

2.03 FINISHING:

A. JOB SITE FINISHING:

1. Doors indicated to be job site finished shall be factory back primed.

a. Doors Scheduled for Opaque Paint finish: Prime with one coat of wood primer indicated on Section 09 91 00, Painting and Coating.

b. Doors Schedules for Transparent Finish: Prime with stain and first coat of finish as indicated in Section 09 91 00, Painting and Coating.

2. Door Finish: Per Section 09 91 00, Painting and Coating.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install Work of this section as specified in the Woodwork InstituteI Manual of MillWork, Section 12 and provide a Woodwork Institute Certified Compliance Certificate for Installation at Substantial Completion. Install fire doors in accordance with NFPA 80.

B. Provide each door accurately cut, trimmed, and fitted to its frame and hardware. Clearance at lock and hanging stile and at top shall be 1/8 inch, and bottom shall not exceed 1/4 inch except where otherwise indicated. Arises shall be rounded to a 1/16 inch radius, and lock rail edges shall be slightly beveled. Screws for hardware shall not be driven but screwed into pre-drilled holes.

C. Doors shall operate freely, but not loosely, without sticking or binding, without hinge-bind conditions and with hardware properly adjusted and functioning.

3.02 CLEAN UP

A. Remove rubbish, waste and debris and legally dispose of off the Project site.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 08 31 00

ACCESS PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Steel access panels, except those specified under Divisions 23 or 26.

C. Related Sections:

2. Section 09 24 00: Portland Cement Plaster.

3. Section 09 29 00: Gypsum Board.

4. Section 09 30 00: Tile.

5. Section 09 90 00: Painting and Coating.

6. Division 23: Mechanical

7. Division 26: Electrical

8. Division 27: Low Voltage Systems

1.02 SUBMITTALS

A. Shop Drawings:

1. Indicate sizes, materials, thickness, fabrication methods, panel door and frame reinforcement, anchorage, and installation details.

2. Provide layout drawings, indicating dimensioned locations of proposed access panels, size of each panel, and installation details. Determine and indicate required access panels in finished surfaces, whether furnished under this section or as part of Work of Divisions 23 and 26.

1.03 QUALITY ASSURANCE

A. Panels shall be provided with UL listings and labels.

B. Access panels and frames shall be products of one manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

A. Panels and Frames: Provide protection as required by manufacturer to protect

panels from damage during storage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Access Panels:

Non-Rated	Milcor	Karp	Nystrom
Ceramic Tile	MS	DSC214M	APTM
Plaster	K	DSC214M	APPW
Drywall, Plaster Veneer	DW	DSC214M	APWB
Rated B-Label			
Ceramic Tile	MS	KRP150FR	APFR
Plaster	M	KRP150PR	APFR-WP
Drywall, Plaster Veneer	M	KRP150FR	APFR-WP

B. Unless otherwise indicated, provide brushed stainless steel finish for panels installed in ceramic tile. Provide prime coat finish suitable for field painting for panels installed in other finishes.

C. Access Panels shall be 18 gage minimum with vandal-proof lock operated by Allen wrench or other special tool. Exposed fastenings shall be secured with vandal-proof screws.

PART 3 - EXECUTION

3.01 GENERAL

A. Provide access panels in finish construction, where indicated on Drawings, wherever required for access to concealed mechanical and electrical equipment, and where required by codes. Panels indicated on architectural Drawings shall be furnished under this section. Required panels for access to equipment, but not indicated on architectural Drawings, shall be furnished as part of Work requiring access.

3.02 INSTALLATION

A. Install panels accurately in location, perfect alignment, plumb, straight and true. Brace to prevent displacement by adjacent Work.

B. Examine panels after installation for proper opening, closing and clearances. Replace damaged or defective panels.

3.03 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

3.04 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 08 41 13

ALUMINUM WINDOWS, DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Aluminum windows, doors, and frames as indicated.

C. Related Sections:

1. Section 07 92 00: Joint Sealants.

2. Section 08 71 00: Door Hardware.

3. Section 08 80 00: Glazing.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Drawings indicate locations, sizes, profiles and general details of aluminum windows, door and frame construction and installation.

B. Performance Requirements: Comply with the following as a minimum requirement:

1. Air Infiltration: When system is tested according to NAAMM TM-1-68T, Section 4.3, air infiltration at perimeter of operating doors shall not exceed 0.25 cubic feet per minute per foot of sash perimeter, with air infiltration from other sources, including fixed doors and windows, not exceeding 0.06 cubic feet per minute per square foot of wall area, except the more restrictive requirements of governing laws and codes shall determine the maximum allowable infiltration. In computing wall area, areas of operating doors is not included.

C. Regulatory Requirements: Comply with CBC requirements.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings for the Work of this section, prepared and reviewed before fabrication. Include plans, elevations, opening, identification symbols, sizes, and complete details for materials, finishes, sizes, profiles, moldings, dimensioned locations of hardware items with reinforcement, methods of anchoring, assembly, installation, isolation, glazing procedure as well as reglazing procedures, materials, and caulking.

B. Product Data: Submit manufacturer's Product Data.

C. Material Samples: Submit the following:

1. Window, door and frame sections with specified finish, fasteners and accessories.

2. Cured sealant colors.

D. Calculations: Provide structural calculations, signed and sealed by a structural engineer licensed in the State of California, indicating that materials furnished for installation conform to requirements specified.

E. Mock-ups: Provide mock-up of one typical door and window unit for review by the Architect.

1.04 QUALITY ASSURANCE

A. Quality Standards: Provide aluminum Work so that glass installation conforms to ANSI Z97, as applicable.

1.05 WARRANTY

A. Manufacturer shall provide a 20 year material warranty for aluminum storefront.

B. Manufacturer shall provide a 10 year material warranty for doors.

PART 2 - PRODUCTS

2.01 Materials:

A. Extrusions shall be 6063-T5 alloy and temper, ASTM B 221 alloy G.S. IDA-T5. Fasteners, where exposed, shall be aluminum, stainless steel, or zinc-plated steel in accordance with ASTM B 663. Perimeter anchors shall be aluminum or steel. Steel anchors shall be isolated from the aluminum as required.

1. Major portions of door sections, except glazing beads, shall be nominal 0.125 inch.

2. Wall thickness of frame members shall be nominal 0.093 inch.

B. Glazing gaskets shall be EPDM elastomeric extrusions or vinyl reinforced with fiberglass cord.

C. Door stiles and rails shall be tubular sections, accurately joined at corners with heavy concealed reinforcement brackets secured with bolts and screws, and shall be MIG- welded. Doors shall be furnished with snap-in stops with bulb glazing gasket both sides of glass. Exposed screws are not permitted. Each door leaf shall be furnished with an adjusting mechanism, located in the top rail near the lock stile, which provides for minor clearance adjustments after installation. A hard-backed poly-pile weatherstrip shall be installed in both stiles of center hung single doors.

D. Hardware: Finish hardware shall be as specified in Section 08 71 00: Door Hardware.

2.02 FINISH

A. Windows and accessories shall be furnished with an organic finish applied over a five-stage aluminum pre-treatment. Finish shall be a two-coat PVDF fluorocarbon coating system with a minimum of 1.2 mil thickness and conforming to AAMA 2605.

2.03 MANUFACTURERS

A. Framing system shall be as manufactured by RPS Architectural Systems, Kawneer Co., or United States Aluminum Corporation. Framing sections shall be 1-3/4 inches x 4 inches Center Glazing System x 1/4 inch glazing.

B. Basis of Design: Kawneer, Trifab 450 system with monolithic glazing for storefronts, Series 7225 non-thermal fixed & project out window.

2.04 FABRICATION

A. The framing system shall provide continuous head and sill channels spliced together with formed brake metal sleeves at center of vertical mullions. The framing system shall provide for flush glazing on sides with no projecting stops. Vertical and horizontal framing members shall have a nominal face dimension and overall depth shall be as noted above. Door framing members shall match glass framing appearance.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Glass framing shall be installed in correct locations as indicated in the details and shall be level, square, plumb and in alignment with other members. Joints between framing and the building structure shall be sealed as required.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.02 SUMMARY

A. Section Includes: Finish hardware except as otherwise specified or specifically omitted herein.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry.
2. Section 08 11 00 - Steel Doors and Frames.
3. Section 08 14 00 - Wood Doors.
4. Section 08 41 00 - Entrances and Storefronts.

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets and locks.
3. Signs.
4. Toilet accessories.
5. Installation.
6. Rough hardware.

1.03 REFERENCES

A. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply unless noted otherwise).

B. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

C. ANSI - American National Standards Institute.

D. BHMA - Builders Hardware Manufacturers Association.

E. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

F. DSA - Division of the State Architect.

G. NFPA 80 - Fire Doors and Windows.

H. UL - Underwriters Laboratories

1.04 SUBSTITUTIONS & SUBMITTALS

A. Requests for substitutions must be made in writing 10 days prior to bid date to allow architect to issue an addendum. If proposing a substitute, submit that product data attached to one showing specified item and indicate savings to be made. Provide sample if requested. No other substitutions will be allowed.

1. Items listed with no substitute manufacturers have been requested by Owner to match existing.

B. SUBMITTALS: Submit six copies of schedule within 4 weeks after project has been awarded. Organize schedule into "Hardware Sets" with an index of doors and heading, indicating complete designations of every item required for each door or opening. Include the following information:

1. Type, style, function, size, quantity and finish of each hardware item. Use BHMA Finish codes as per ANSI A156.18.
2. Name, part number and manufacturer of each item.
3. Fastenings and other pertinent information.
4. Location of hardware set cross referenced to indications on drawings both on floor plans and in door schedule.
5. Explanation of all abbreviations, symbols, and codes contained in schedule.
6. Mounting locations for hardware.
7. Door and frame sizes and materials.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Obtain each kind of hardware (latch and lock sets, exit devices, hinges, and closers) from only one manufacture, although several may be indicated as offering products complying with requirements.

2. Hardware supplier shall be a direct factory contract supplier who has in his employment a certified hardware consultant (AHC) who is available at all

reasonable times during the course of the work for project hardware consultation to the Owner, Architect, and Contractor.

B. Schedule Designations: Except as otherwise indicated, the use of one manufacturer's numeric designation system in schedules does not imply that another manufacturer's products will not be acceptable, unless they are not equal in design, size, weight, finish, function, or other quality of significance. See 1.04.A for substitutions.

1.06 REGULATORY REQUIREMENTS

A. Fire-Rated Openings: Comply with CBC Section 715 and NFPA No. 80. Provide only hardware tested and listed by UL for the type and size of each door required, which complies with the requirements of the door and frame labels.

1. Where exit devices are required on fire rated doors, provide supplementary marking on door UL label indicating "Fire Door to be Equipped with Fire Exit Hardware", and provide UL label on exit device indicating "Fire Exit Hardware".

B. Conform to applicable requirements of the Americans with Disabilities Act Accessibility Guidelines regarding accessibility requirements for door and entrance hardware.

C. Door hardware shall meet the requirements of CBC Sections 1133B.2.1, 1133B.2.5.2, and 1008.1.8.

D. Hand activated door opening hardware, handles, pulls, latches, locks, and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist to operate, per CBC Section 1117B.6.4. Mounting height of latching hardware shall be centered between 30 inches to 44 inches above the finished floor, per CBC Section 1133B.2.5.2.

E. Pressure to operate doors shall not exceed 5 lbs. (22.2N) for exterior doors and 5 lbs. (22.2N) for interior doors. When fire doors are required, the maximum effort to operate the door shall not exceed 5 lbs. (22.2N), except that, when approved by the appropriate administrative authority, the maximum effort required to operate the door may be increased not to exceed 15 lbs. (66.72N), per CBC Sections 1008.1.2 and 1133B.2.5 /ADAAG 4.13.11.

F. Door closers and stops shall not reduce headroom to less than 78 inches. Door closers, when provided, shall have sweep period adjusted so that from an open position of 70 degrees the door will take at least 3 seconds to move to a point 3

inches from the latch, measured to the leading edge of the door, per CBC Sections 1003.3.1 Exception and 1133B.2.5.1.

G. Thresholds shall comply with CBC Sections 1008.1.6 and 1133B.2.4.1.

H. Floor stops shall not be located in the path of travel and 4 inches maximum from walls, per DSA Policy 99-08.

I. Hardware (including exit devices) shall not be provided with "Night Latch" (NL) function for any accessible doors or gates unless the following conditions are met per DSA Interpretation 10-08 DSA /AC (External), revised 4/28/09. Such conditions must be clearly demonstrated and indicated in the specifications:

1. Such hardware has a 'dogging' feature.
2. It is dogged during the time the facility is open.
3. Such 'dogging' operation is performed only by employees as their job function (non-public use).

J. Exit devices shall comply with CBC Section 1008.1.9

K. Exit devices shall be so mounted (centered between 36 inches and 44 inches above finished floor as recommended) that the clear width of the exitway is not less than 32 inches measured between the face of the door and the opposite stop, per CBC Section 1133B.2.2 and Figure 11B-5B.

L. The unlatching force of an exit device shall not exceed 5 lbs. (22.2N), applied in the direction of travel, per CBC Section 1117B.6.4.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site: Individually package each unit of finish hardware complete with proper fastening and appurtenances, clearly marked on the outside to indicate contents and specific locations in the Work.

B. Deliver packaged hardware items at the times and to the locations (shop or field) for installation, as directed by the Contractor.

1.08 PROJECT CONDITIONS

A. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Upon request, check the Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.09 WARRANTY

A. Provide guarantee from hardware supplier as follows:

1. Closers: Five years, except electronic closers, two years.
2. Exit Devices: Two years.
3. All other Hardware: Two years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approval of manufacturers other than those listed shall be in accordance with paragraph 1.04.A.

Item:	Manufacturer:	Acceptable Substitute:
Continuous Hinges	Markar	Stanley, Hager
Butt Hinges	McKinney	Stanley, Hager
Locksets	Sargent	As specified
Cylinders	Medeco	As specified
Armor Collars	Keedex	Or equal
Exit Devices	Sargent	As specified
Surface Closers	Norton	As specified
Anti Vandal Pulls	Trimco	Sargent, Ives
Auto Flush Bolts	Trimco	Hager, Ives
Coordinators	Trimco	Hager, Ives
Kick Plates	Trimco	Hager, Ives
Door Stops	Trimco	Hager, Ives
Silencers	Trimco	Hager, Ives
Overhead Stops	Rixson	Sargent, ABH
Thresholds/Seals/Sweeps	Pemko	Reese, NGP

B. Furnish items of hardware required to complete the work in accordance with these specifications and the manufacturers' instructions. Items of hardware not specified shall be provided even though inadvertently omitted from this specification. Items shall be of equal quality and type.

C. Where the exact types of hardware specified are not adaptable to the finished shape or size of the members requiring hardware, furnish suitable types having as nearly as

practicable the same operation and quality as the type specified, subject to Architect's approval.

D. Carefully inspect Project for the extent of the finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, furnish finish hardware to specification.

2.02 MATERIALS

A. Locksets: Locksets and latchsets shall be as specified. Strikes shall be 16 gage curved steel, bronze or brass with 1" deep box construction, and have lips of sufficient length to clear trim and protect clothing.

1. Comply with requirements of local security ordinances.
2. Provide approved fusible links at levers for labeled doors.
3. Lock Series and Design: Sargent 8200 series LW1L lever.

B. Butt Hinges: Outswinging exterior doors shall have nonremovable (NRP) pin. Hinge open widths shall be minimum, but of sufficient size to permit door to swing 180 degrees.

1. Furnish 3 hinges per leaf to 7 foot, 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
2. Provide 5 inch heavy weight hinges on doors over 3 feet 5 inches width.

C. Continuous Hinges: Hinge open widths shall be minimum, but of sufficient size to permit door to swing 180 degrees. Where necessary to maintain door clearance at jamb trim, frame conditions, door reveals and similar conditions, furnish wide throw hinges as approved by the Architect. Where door is indicated as having fire resistance rating, provide UL listed and labeled hardware.

D. Exit Devices: Furnish devices at wood doors with sex bolts unless otherwise specified. Lever handle trim shall match locksets.

1. Provide glass bead kits of proper thickness where the rail assembly of the exit device crosses a lite.

E. Surface Door Closers: Full rack and pinion type with removable non-ferrous case. Provide sex bolts and grommets at wood doors. Place closers inside building, stairs, and rooms. Closers shall be non-handed, non-sized, and installed to permit door to swing 180 degrees.

1. Flush transom offset brackets shall be used where parallel arm closers are listed for doors with fixed panels over.

2. Provide drop brackets, shoe supports, and blade stop spacers as required at narrow top rails.

F. Kick Plates: Provide with four beveled edges, .050 inches minimum thickness, 10 inches high by width less 2 inches. Furnish with machine or wood screws of bronze or stainless steel to match other hardware.

G. Floor Stops: Floor mounted door stops are prohibited where located in the path of travel. Where provided, install maximum 4 inches from wall surface.

H. Seals: Seals shall be finished to match adjacent frame color. UL label shall be applied on rated doors.

I. Screws: Exposed screws shall be Phillips head. Do not use self-drilling, self-tapping screws, unless furnished by hardware manufacturer for the specific condition or for mounting flat-goods such as push plates and kick plates.

J. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors.

K. Thresholds: Change in level between 1/4 inch and 1/2 inch shall be beveled with a slope no greater than 1 unit vertical to 2 units horizontal (50 percent slope). The floor or landing shall not be more than 1/2 inch lower than the threshold or doorway.

2.03 FINISH

A. Generally to be BHMA 626 Satin Chromium.

1. Areas using BHMA 626 shall have push, pulls and kick plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.

B. Spray door closers to match other hardware, unless otherwise noted.

C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.04 KEYING REQUIREMENTS

A. Key into existing system as directed by the District. Contact the District Locksmith with Glendale Unified School District (818-242-0003) for keying requirements.

1. Key system shall be Medeco I/C core cylinder.

B. Stamp master keys and grand master keys with a registry number. Do not stamp "Master" or letter "M".

C. Stamp individual room keys with plain identification number. Do not indicate key cut.

D. Factory cut keys and stamp "DO NOT DUPLICATE".

E. Cylinders shall be Full Size Interchangeable Core (FSIC). Provide temporary cores for construction. Temporary cores shall be returned to the Contractor. District to change cores at completion of project and return temporary cores to Contractor.

F. Contractor and hardware supplier shall meet with the Owners Representative and Architect to establish the keying schedule and to provide the correct grand master, pass and change key groups to properly operate locking devices.

G. Provide record and registration system as directed by the Architect.

H. Locksets and cylinders shall be keyed, master keyed, and grand master keyed at the factory. Supply 4 change keys for each lock and one master and grand master for each set of locks.

I. Contractor shall be responsible for completion of keying schedule and ordering construction and permanent keys.

J. Key Control:

1. Permanent cores and sample set of permanent keys shall not be used during the construction phase of the Project. Temporary construction cores and keys used for securing the Work is included as part of the Work of this Section and shall be provided by the Contractor.

2. Upon Substantial Completion of the Work, sample set of original keys shall be returned to the District Representative. Duplication of District keys, or retaining keys, is not permitted.

3. Secure from District Locksmith a Letter of Authorization/Permission to order the District standard cylinders/cores.

4. Deliver keys directly to District Locksmith by registered security shipment direct from hardware manufacturer. Hardware supplier shall not cut keys.

PART 3 - EXECUTION

3.01 HARDWARE LOCATIONS

A. Mounting heights for hardware:

1. Lockset: 30 to 44 inches above finished floor. Verify manufacturers' template with door design.

2. Exit device: 36 to 44 inches above finished floor. Verify manufacturers' template with door design.

3. Door Pull: 40 inches from bottom of door to center of pull.

4. Floor Stop: Installed at a maximum of 4 inches from the face of the wall or partition.

B. Conform to CCR, Title 24, Part 2, and ADAAG for the positioning requirements for accessibility.

3.02 INSTALLATION

A. Pre-Installation Meetings: Initiate and conduct with supplier, installer, and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware, and door closers in the meetings.

B. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

3.03 ADJUSTING

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.

B. Inspection: Hardware supplier shall inspect hardware furnished within 10 days of contractors request and include with his guarantee a statement that this has been accomplished. Inspector or Contractor will sign off the hardware as being complete and correctly installed and adjusted. Further corrections of defective material shall be the responsibility of his representative.

3.04 SCHEDULE OF DOOR HARDWARE

A. Legend of listed manufacturers:

KEE Keedex
MAR Markar
MCK McKinney
MED Medeco
NOR Norton
PEM Pemko
RIX Rixson
SAR Sargent
TRM Trimco

B. The last column in the Schedule of Door Hardware refers to the manufacturer listed above.

C. The Door Schedule on the Drawings indicates which Hardware Set is used with each door.

D. Schedule of Door Hardware:

HW-1
Exterior single door from Classroom with Panic Hardware and 90 degree swing Closer

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	EXIT DEVICE	16-8804 x LESS TRIM	630	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C RIM CYLINDER	32W0405H	626	MED
2	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1097HA-SP	630	TRM
1	SURFACE CLOSER	CPS7500-T	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1 SET	SOUND SEALS	S88 HEAD & JAMBS	BLK	PEM
1 SET	DOOR SEALS	2891S HEAD & JAMBS	628	PEM
1	DOOR SWEEP	57V	628	PEM
1	AUTO DOOR BOTTOM	430MRL	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

Install door seals before closer and strike

HW-2
Exterior single door from Classroom with Security Lockset and 90 degree swing Closer

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	8292 x LW1L x L/CYL	626	SAR
2	I/C MORTISE CYLINDER	32W0200	626	MED
2	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE

1	ANTI VANDAL PULL	1096HA	630	TRM
1	SURFACE CLOSER	CPS7500-T	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1 SET	SOUND SEALS	S88 HEAD & JAMBS	BLK	PEM
1 SET	DOOR SEALS	2891S HEAD & JAMBS	628	PEM
1	DOOR SWEEP	57V	628	PEM
1	AUTO DOOR BOTTOM	430MRL	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM
	Install door seals before closer			

HW-3

Exterior rated single door from Classroom with Security Locket and 90 degree swing Closer

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	8238 x LW1L x L/CYL	626	SAR
2	I/C MORTISE CYLINDER	32W0200	626	MED
2	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	SURFACE CLOSER	CPS7500	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1 SET	SOUND SEALS	S88 HEAD & JAMBS	BLK	PEM
1 SET	DOOR SEALS	2891S HEAD & JAMBS	628	PEM
1	DOOR SWEEP	57V	628	PEM
1	AUTO DOOR BOTTOM	430MRL	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM
1	LOCK ASTRAGAL	5000-T	626	TRM
	Install door seals before closer			

HW-4

Exterior single door to Boys/Girls Restroom with Holdback Lockset

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	8291 x LW1L x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1097HA	630	TRM
1	SURFACE CLOSER	7500	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1	MOP PLATE	KM050 - 6 x 1 LDW B4E	630	TRM
1	WALL BUMPER	1270CVPV	626	TRM
3	SILENCERS	1229A	GRY	TRM
1	DOOR BOTTOM	217PK	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

HW-5

Exterior single door to Boys/Girls Restroom with Holdback Lockset and Overhead Stop

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	8291 x LW1L x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1097HA	630	TRM
1	SURFACE CLOSER	7500	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1	MOP PLATE	KM050 - 6 x 1 LDW B4E	630	TRM
1	OVERHEAD STOP	6 SERIES - STOP ONLY	630	RIX
3	SILENCERS	1229A	GRY	TRM
1	DOOR BOTTOM	217PK	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

HW-6
Exterior single door to Staff Restroom with Hotel Lockset

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	50-LB8250 x LW1L x L/OST x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W1201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1097HA	630	TRM
1	SURFACE CLOSER	7500	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1	MOP PLATE	KM050 - 6 x 1 LDW B4E	630	TRM
1	WALL BUMPER	1270CVPV	626	TRM
1	COAT HOOK	3071	626	TRM
3	SILENCERS	1229A	GRY	TRM
1	DOOR BOTTOM	217PK	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

HW-7
Exterior single door to Staff Restroom with Hotel Lockset and Overhead Stop

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	50-LB8250 x LW1L x L/OST x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W1201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1097HA	630	TRM
1	SURFACE CLOSER	7500	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1	MOP PLATE	KM050 - 6 x 1 LDW B4E	630	TRM
1	OVERHEAD STOP	6 SERIES - STOP ONLY	630	RIX
1	COAT HOOK	3071	626	TRM
3	SILENCERS	1229A	GRY	TRM

1	DOOR BOTTOM	217PK	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

HW-8
Exterior single door to Custodian/IDF/Electrical with Storeroom Lockset

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	8206 x LW1L x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1097HA	630	TRM
1	FLOOR STOP	1214	626	TRM
1 SET	DOOR SEALS	2891S HEAD & JAMBS	628	PEM
1	DOOR BOTTOM	217PK	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

HW-9
Exterior single door from Custodian/IDF/Electrical with Storeroom Lockset and Door Holder

1	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1	LOCKSET	8206 x LW1L x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1096HA	630	TRM
1	DOOR HOLDER	NO. 2	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1 SET	DOOR SEALS	2891S HEAD & JAMBS	628	PEM
1	DOOR SWEEP	57V	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM
	Install door seals before holder			

HW-10
Exterior pair doors from Storage/Electrical with Storeroom Lockset and Door Holder

2	CONTINUOUS HINGE	FM-300 x M-CHS2	630	MAR
1 SET	AUTO FLUSH BOLT	3820 x 3810	626	TRM
1	DUST PROOF STRIKE	3911	626	TRM
1	LOCKSET	8206 x LW1L x 7/8 STK x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	ARMOR COLLAR	K-24	626	KEE
1	ANTI VANDAL PULL	1097HA	630	TRM
2	DOOR HOLDER	NO. 2	689	NOR
2	KICK PLATE	KO050 - 10 x 1 LDW B4E	630	TRM
1	ASTRAGAL	357 x TB	600	PEM

1 SET	DOOR SEALS	2891S HEAD & JAMBS	628	PEM
2	DOOR SWEEP	57V	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM
	Install door seals before holder			

HW-11
Interior single door to Custodian/IDF/Electrical with Storeroom Lockset

3	HINGE	TA2714 - 4-1/2 x 4-1/2	652	MCK
1	LOCKSET	8204 x LW1L x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1	FLOOR STOP	1214	626	TRM
3	SILENCERS	1229A	GRY	TRM

HW-12
Interior single door from Custodian/IDF/Electrical with Storeroom Lockset and Door Holder

3	HINGE	TA2714 - 4-1/2 x 4-1/2	652	MCK
1	LOCKSET	8204 x LW1L x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	DOOR HOLDER	NO. 2	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
3	SILENCERS	1229A	GRY	TRM

HW-13
Interior single door from Elevator Equipment Closet with Storeroom Lockset and Closer

3	HINGE	TA2714 - 4-1/2 x 4-1/2	652	MCK
1	LOCKSET	8204 x LW1L x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED
1	I/C CORE CYLINDER	32W0201	626	MED
1	SURFACE CLOSER	PR7500	689	NOR
1	KICK PLATE	KO050 - 10 x 2 LDW B4E	630	TRM
1	FLOOR STOP	1214	626	TRM
3	SILENCERS	1229A	GRY	TRM

HW-14
Interior pair doors from Elevator Equipment Closet with Storeroom Lockset and Closer

6	HINGE	TA2714 - 4-1/2 x 4-1/2	652	MCK
1	AUTO FLUSH BOLT	3810 (TOP BOLT ONLY)	626	TRM
1	LOCKSET	8204 x LWL1 x 7/8 STK x L/CYL	626	SAR
1	I/C MORTISE CYLINDER	32W0200	626	MED

1	I/C CORE CYLINDER	32W0201	626	MED
1	COORDINATOR	3094 x 3095/3096 AS REQ'D	600	TRM
2	SURFACE CLOSER	PR7500	689	NOR
2	KICK PLATE	KO050 - 10 x 1 LDW B4E	630	TRM
1	FLOOR STOP	1214	626	TRM
1	ASTRAGAL	357 x TB	600	PEM
2	SILENCERS	1229A	GRY	TRM

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Glass and glazing as indicated.

C. Related Sections:

1. Section 08 21 00: Wood Doors.

2. Section 08 41 13: Aluminum Windows, Doors, and Frames.

3. Section 08 11 13: Hollow Metal Doors, Windows and Frames.

4. Section 08 41 13: Aluminum Windows, Doors and Frames.

5. Section 08 71 00: Door Hardware.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's descriptive literature and installation recommendations for glass, glazing, and accessories.

B. Material Samples: Submit 6-inch square units of each type of glass specified.

1.03 QUALITY ASSURANCE

A. Labeling: Label each piece of glass and glazing and mirrors with manufacturer's name, and the grade or quality of the material. Labels shall be intact before and after installation. Fire-protection-rated glazing shall bear a label or other identification in accordance to CBC 715.4.6.3.

B. Comply with the following as a minimum requirement:

1. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

2. ASTM C1036 - Standard Specification For Flat Glass.

3. ASTM C1048 - Standard Specification For Heat-Treated Flat Glass — Kind HS, Kind FT Coated and Uncoated Glass.

4. CPSC 16 CFR 1201 - Safety Standards for Architectural Glazing Materials issued by the Consumer Products Safety Commission.

5. GANA - Glazing Manual.

6. Solar Heat Gain Coefficient (SHGC): 0.53 or better required to achieve HPI-CHPs pre-requisite points EE1.0 and EE1.1.

7. U-value: 0.78 or better required to achieve HPI-CHPs pre-requisite points EE1.0 and EE1.1.

C. Qualifications of Installer: Minimum 5 years experience installing glass in projects of similar scope and complexity.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver glass and glazing materials with manufacturer's labels intact.

B. Do not remove labels until glass has been installed and inspected by IOR.

C. Protect glass from staining, marking, and damage.

D. Putty and glazing compound shall be delivered to the Project site in manufacturer's original unbroken containers labeled to identify contents.

1.05 PROJECT CONDITIONS

A. Perform glazing when ambient temperature is above 40 degrees F.

B. Perform glazing on clean, dry surfaces only.

1.06 WARRANTY

A. Manufacturer shall provide a 10 year material warranty. Manufacturer shall provide a 20 year material warranty for coatings and thermally or acoustically rated insulation units against deterioration in acoustic or thermal rating.

B. Installer shall provide a 3 year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND FABRICATORS

A. To maximum extent possible, provide domestically manufactured and fabricated glass, and provide glass from one manufacturer.

B. Types of glass specified or indicated shall be manufactured or fabricated by one of the following:

1. Pilkington LOF (fire rated glazing).

2. PPG Glass Technology.

3. Visteon Float Glass Operations.

4. Viracon.

5. Oldcastle.

2.02 GLASS MATERIALS

A. General: Conform to ASTM C1036, ASTM C1048 and to ANSI Z97.1. Label factory cut panes.

B. Float Glass – Type G1: Oldcastle monolithic ¼ inch Pilkington Solar E on Clear Low-E #2 glass with Visible Light Transmittance (VLT) of 60% and Solar Heat Gain Coefficient of 0.53 and U-value of .50.

C. Tinted Float Glass: Type I (transparent glass), Class 2 (tinted heat absorbing and light reducing), quality q3 (glazing select), manufactured by PPG or LOF, color as selected by Architect, minimum 1/4 inch thickness unless otherwise indicated or required.

D. Tempered Glass: Condition A (uncoated surfaces), Type I or II, Class 1, Quality q3 (glazing select), Kind FT (fully tempered glass), match color of clear or tinted glass as applicable; fully thermal tempered, heat strengthening or chemical tempering is not permitted. Perform tempering by horizontal oscillating roller hearth or high speed roller hearth process. Do not permit fabrication processes leaving gripper or tong marks. Handle and size glass according to manufacturer's written instructions.

E. Clear Laminated Glass: 2 layers of 1/8 inch clear float glass with 0.030 inch thick high strength polyvinyl butyral laminating sheet. Edges of laminated glass shall be treated with Ardis 500, or equal, edge protection to prevent contact of laminating sheet with sealants.

F. Tinted Laminated Glass: One layer of 1/8 inch clear float glass and one layer of tinted glass to match other windows, with 0.030 inch thick high strength polyvinyl butyral laminating sheet. Edges of laminated glass shall be treated with Ardis 500, or equal, edge protection to prevent contact of laminating sheet with sealants.

H. Wire Glass: Type II (patterned and wired glass, flat), Class 1 (clear glass), Quality q8 (glazing), Category II, Form 1 (wired, polished both sides), mesh m2 (square). Wire glass for fire rated openings shall bear an identifying UL label or the label of a recognized testing agency and shall be installed in a steel fire rated window frame assembly in compliance with CBC section 715.5.3. Wire glass shall be provided with fire-rated safety film meeting CPSC 16 CFR Part 1201, Category II for impact safety; Superlite I-W, or equal. Safety film shall be installed on interior side of glass. Wire Glass Category I is not acceptable.

I. Obscure Glass: Type II (patterned), Class 1 (clear), Form 3 (patterned), Quality q7 (decorative), patterned one side, pattern as indicated or selected.

2.03 GLASS SETTING MATERIALS

A. Setting Blocks: ASTM C864, channel shape; having 1/4 inch internal depth, Shore A hardness of 80 to 90 Durometer. Blocks shall be a minimum 2 inch long. Block width shall be approximately 1/16 inch less than the full width of the rabbet. Block thickness shall be at least 3/16 inch, sized for rabbet depth as required.

B. Spacers: ASTM C864, channel shape, with 1/4 inch internal depth, 3/32 inch flanges, web, 1/8 inch thick, one to 3 inches long. Spacers shall provide Shore A hardness of 40 to 50 Durometer.

C. Vinyl Glazing Channels: Profile compatible with framing system and designed to accommodate glass of specified thickness, light gray in color. Provide for dry glazing aluminum frames where indicated or permitted.

D. Glazing Tape: Poly-isobutylene based sealant tape, conforming to AAMA 804.1, with adhesive one side protected by temporary paper cover, Extru-Seal manufactured by Pecora Corp., No. 303 by Protective Treatments, Inc., or equal.

E. Spring Steel Spacers: Galvanized steel wire or strip designed to position glazing in channel or rabbet sash with stops.

F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbet sash without stops.

G. Glazing Points (Sprigs): Pure zinc stock, thin, flat, triangular or diamond-shaped pieces, 1/4 inch minimum size.

H. Glazing Sealants for Metal Sash: GE Silicones Silglaze II 2800, GE Silicones Silpruf, GE Silicones 1200 Silicone, and Dow Corning 999A. Polybutylene, oleoresinous, asphalt, and oil base sealants are not permitted. Provide sealant of same color as structural silicone sealant unless otherwise required.

I. Glazing Compound for Wood Sash: Acrylic latex caulk by Tremco. Provide for bedding and caulking glass in wood frames.

J. Glazing Compounds and Sealants for Thermoplastic: Provide silicone, butyl, or polysulfide glazing compound.

K. Mirror Setting Materials: Manufactured by Palmer Products Corporation, or equal, for installation of mirrors, and as follows:

1. Mirror backing paint: Mirro-Bac Paint, or equal, formulated to protect mirror silvering.

2. Mirror bond coat: Mirro-Mastic Bond, or equal, formulated to isolate deleterious backing materials from mastic and mirror.

3. Mirror mastic: Mirro-Mastic, or equal, formulated for adhering mirrors and glass to substrates.

2.04 SPEAK HOLES

A. Speak holes shall be stock No. 444, 4 inches outside diameter, 3 inches inside diameter for 1/4 inch plate glass, stainless steel as manufactured by Nissen and Co., or equal.

PART 3 - EXECUTION

3.01 TOLERANCES

A. Thickness indicated or specified are nominal within standard tolerances. Maximum size of vertical panes shall not exceed following:

Glass Thickness Double Strength:	1/8 inch	3/16 inch	1/4 inch
Maximum Areas in Square Feet:	12	16	20

3.02 INSTALLATION, GENERAL

A. Glazed cabinet doors, windows, transoms, and fixtures, not otherwise noted or indicated, shall be glazed with clear float glass. Room or entrance doors shall be glazed with clear wire glass.

B. Obscure glass in exterior openings shall be installed with smooth side of glass to weather. Patterned glass shall be installed with pattern running vertically, unless otherwise indicated.

C. Glazing tapes or sealants shall be installed wherever glass contacts wood or metal surfaces. Width of strips shall be as required.

D. Glazing compound shall be neatly and cleanly installed in straight lines, even with inside edge of sash members. Thumb puttying is not permitted.

E. Display Cases and Sliding Glass Doors in Casework: Glass in display cases shall be 1/4 inch thick clear wire glass or float glass as indicated. Edges of glass shall be rounded and polished.

F. Serving windows in cafeterias with speak holes shall be laminated safety glass.

G. Glazing Aluminum Sash: Glazing material in aluminum sash shall be installed in compound and secured in place with aluminum glazing beads. In addition, horizontal beads shall be installed with 6 inch x one inch, type A, self-tapping, stainless steel, Phillips-head screws, installed into pre-drilled, counter-sunk holes and spaced 2 inches from each end and 9 inches on centers.

H. Speak holes shall be installed according to glass manufacturer's written recommendations.

3.03 INSTALLATION OF GLASS

A. Conform to requirements of GANA Glazing Manual.

B. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.

C. Provide compressible filler rods or equivalent back-up material to prevent sealant from extruding into glass channel weep systems, from adhering to back surface of joints and to control depth of sealant for optimum performance.

D. Force sealants into glazing channels, in manner to eliminate voids and to ensure complete bond of sealant to glass and channel surfaces.

E. Tool exposed surfaces of sealants to provide for drainage away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

F. Where dry glazing of aluminum frame is indicated or permitted, provide vinyl glazing channels installed in accordance with frame manufacturers written recommendations. Do not stretch channels. Miter corners.

G. For tape glazing, furnish tape of thickness to provide approximately 30 percent compression. Cut tape to proper length and install to permanent stops, the entire length of the head and sill first, then to jambs. Butt tape together with no overlap and remove paper backing. Install glass on setting blocks at quarter points and maintain uniform glass edge clearance around entire perimeter of glass. Maintain manufacturer's recommended edge clearance and bite on glass. Install glass firmly into tape with a slight lateral movement to assure proper adhesion. Install tape to removable stop with evenly distributed firmness, smoothing out wrinkles in tape. Secure removable stop in proper position so tape makes contact with glass as stop is installed, forcing contact with glass and completely sealing joint. Remove excess tape from both sides at slight angle over sight line. Do not undercut.

H. Glass in Wood Frames: Install glass with glazing points and setting blocks as required. Seal glass with glazing compound and secure with wood stops. Install stops with fine finishing nails, and set for putty stopping.

I. Patterned Glass: Install glass with one patterned smooth surface on the weather side.

J. Wire Glass: Install glass for fire doors in accordance with installation requirements of NFPA 80.

K. Laminated Glass: Sashes, which are to receive laminated glass, shall be weeped to the outside to permit water in the channel to drain from the frame.

L. Unframed Mirrors: Walls shall be clean, dry, plumb, rigid and smooth. Install mirror backing paint to back of mirror and to edges. Install mirror bond coat over painted backing, wood backing, concrete and masonry to receive mirrors. Bond coat is not required over vitreous surfaces. Install sufficient mirror adhesive to provide

100 percent coverage when mirror is installed. Install mirror into place, providing 3/16 inch clearance between mirror and substrate. Support mirrors with temporary edge channels to allow mastic set-up, and where indicated or required, provide permanent top and bottom edge channels.

M. Framed Mirrors: Walls shall be clean, dry, plumb, rigid and smooth. Install mirrors with concealed mounting devices, and secure with concealed screws on bottom of mirror. Conform to manufacturers written recommendations.

3.04 PROTECTION AND CLEANING

A. Protect exterior glass from breakage by furnishing crossed streamers attached to framing and away from glass surface. Do not directly install markers to glass surfaces. Remove non-permanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer. Glazing, which cannot be cleaned to a required condition, shall be deemed defective Work.

D. Remove and replace glass, which is broken, chipped, cracked, abraded, or damaged during construction.

E. Remove protective covering from thermoplastic not more than 4 days before Substantial Completion, and immediately before cleaning. Methods of final cleaning and finishing shall be as prescribed by thermoplastic glazing publications referenced above.

F. Wash glass on both faces not more than 4 days before Substantial Completion. Wash glass by method recommended by glass manufacturer. Do not furnish harsh cleaning agents, caustics, abrasives, or acids for cleaning. Polish glass both sides and leave free of soil, streaks, and labels.

3.05 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.06 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 22 16

METAL SUPPORT ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Metal support systems as indicated and/or described.

C. Related Sections:

1. Section 05 41 00: Load-Bearing Metal Studs.

2. Section 09 24 00: Portland Cement Plaster and Metal Lath.

3. Section 09 29 00: Gypsum Board.

1.02 SYSTEM DESCRIPTION

A. Regulatory Requirements: Comply with DSA and CBC requirements.

B. Design Requirements: Metal Studs: Studs for interior partitions shall be roll-formed channel or C-shapes.

2. Track: Stud track for floor and ceiling anchorage shall be channel configuration, sized to fit studs. Galvanized steel as manufactured for installation with specified metal studs.

3. Design: Design is based on minimum 5 pounds per square foot load applied perpendicular to walls. Deflection shall not exceed 1/240 under design load.

1.03 SUBMITTALS

A. Shop Drawings: Submit drawings showing framing, connection details, accessories and anchorage. Indicate location of assemblies and size and spacing of framing components.

B. Product Data: Submit manufacturer's catalog data for each item proposed for installation.

C. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

1.04 QUALITY ASSURANCE

A. Coordinate with related Work to provide blocking for items mounted on finished surfaces and to provide allowances for pipes and other items inside partitions and walls.

B. Comply with following as a minimum requirement:

1. American Welding Society (AWS): Structural Welding Code Steel (D1.1); and Structural Welding Code Sheet Steel (D1.3).

2. ASTM Standards:

a. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

b. ASTM A 1008 – Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.

c. ASTM A 641 – Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire.

d. ASTM C 645 – Standard Specification for Non-Structural Steel Framing Members.

e. ASTM C 955 – Standard Specification for Load Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

f. ASTM C 954 – Standard Specification for Steel Drill Screws for Application of Gypsum Panel Products or Metal Bases to Steel Studs From 0.033 Inch to 0.112 Inch in Thickness.

g. ASTM E 1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.

C. Tolerances: Install walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10 foot straightedge for its entire length at any location within a 1/8 inch tolerance. Install horizontal framing level within a tolerance of 1/8 inch in 12 feet in any direction.

1.05 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered in their original unopened packages and stored protected from damage. Do not store material directly on grade. Provide adequate support to prevent bowing of material prior to installation.

B. Store welding electrodes in accordance with AWS D12.1.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products manufactured by one of following:

1. Dale/Incor.

2. Dietrich Industries, Inc.

3. Marino/Wade.

4. Camco

5. Current members of Steel Stud Manufacturers Association (SSMA).

2.02 MATERIALS

A. Light Gage Metal Framing:

1. Metal framing shall be formed from corrosion resistant-steel conforming to requirements of ASTM A653, 33 ksi minimum.

2. Metal framing shall be zinc coated in conformance to requirements of ASTM A926, G60.

3. Metal framing shall be manufactured in conformance to ASTM C645.

4. Install metal framing according to ASTM C1007, Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.

B. Studs: SSMA, ICBO ER-4943P, minimum yield 33 ksi, hot-dipped galvanized or electro galvanized sheet steel, G-60, C Stud type, punched web (except tracks and joists), C-shaped, sizes required to conform to details and scheduled wall thicknesses. Studs shall be rolled from new steel sheet and shall not be produced from re-rolled steel. Stud flanges shall not be less than 1-5/16 inch wide; track flanges, not less than 1-1/4 inch wide.

1. Wall Framing and Furring for Plaster and Mortar Beds: Studs and tracks shall be 18 gage minimum, unless otherwise indicated.

2. Wall Framing and Furring for Gypsum Wallboard: Studs and tracks shall be 20 gage minimum, unless otherwise indicated.

3. Load-Bearing Studs: Studs and members thicker than 18 gage (0.0438 inch) shall conform to requirements of Section 05410, Load-Bearing Metal Studs.

4. Stud gages indicated on Drawings or specified are the minimum. Where required stud height and/or loads exceed code requirements or

manufacturer's recommendations, provide heavier gage studs and/or decrease stud spacing as necessary to conform to code requirements.

C. Suspended and Furred Ceiling Systems and Wall Furring: Suspended ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. suspension system shall provide a maximum deflection of L/240. Carrying channels shall be fabricated from minimum 0.0548 inch thick cold-rolled steel, 1-1/2 inch wide x 7/16 inch deep. Carrying channels for supports under ducts shall be 2 inches in size as specified. Carrying channels shall be fabricated from hot-dip galvanized coated sheet.

1. Plaster Ceilings: Cross furring members shall conform to ASTM C 645, and shall be fabricated from cold-rolled steel, 3/4 inch wide x 7/16 inch deep. Furring members shall be fabricated from hot-dip galvanized coated sheet.

2. Gypsum Wallboard Ceilings: Furring members shall be fabricated from cold-rolled steel, 7/8 inch x 2-9/16 inches. Furring members shall be fabricated from hot-dip galvanized coated sheet.

D. Framed Ceilings: Framed ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. suspension system shall provide a maximum deflection of L/240.

1. Plaster and Gypsum Wallboard Ceilings: Ceiling joists shall conform to ASTM C 645, hot-dip galvanized coated steel, C-shaped, unpunched, 20 gage minimum thickness, unless noted otherwise.

E. Shaft Wall Framing Members: CH studs and J runners, 20 gage minimum for 2, 4 or 6 inch studs, conforming to ASTM 645, fabricated of steel conforming to ASTM A 653, hot-dip galvanized.

F. Framing Accessories: Provide all standard related accessories including floor and ceiling tracks, clips, web stiffeners, anchors, and similar items, of same manufacture as each type of stud specified, and as required for a complete installation.

1. Fire Rated Top Tracks: Conform to requirements of Section 09110, Top Track Fire-Rated System.

G. Splay Wires and Compression Struts: Approved manufacturers acceptable to manufacturer of ceiling grids, gages and types as required by building codes for ceiling types and weights specified.

H. Wires: Soft-annealed galvanized steel wire, 8 gage for hanger wires and 16 gage for framing unless otherwise specified.

I. Fasteners: Wafer-head screws, self-drilling type for 20 gage metal and heavier. ASTM C954 self-drilling, self-tapping screws, Type S-12 pan head, ½ inch long.

J. Fire Rated Acoustical Foam Tape: Compressible, closed cell polyvinyl chloride foam with pressure sensitive adhesive, in rolls with protective release liner on non-adhesive face, 6 pounds per cubic foot density, 1 inch wide x not less than 1/4 inch thick, self-extinguishing, UL 94 recognized, Norseal V740FR, manufactured by Norton Performance Plastics Corporation, or equal.

K. Acoustical Sealant: Permanently resilient type, non-hardening, manufactured by USG, Gold Bond, or equal.

L. Zinc-Rich Paint: Conform to Fed Spec DOD-P-21035A, Z.R.C. "Cold Galvanizing Compound", manufactured by ZRC Products Company. Provide for touch-up of galvanized surfaces.

M .Steel Backing Plates: Provide a minimum 4 inch wide by 16 gage steel, or sections of studs and stud track welded or fastened to web of studs, except as otherwise indicated. Apply shop coat of metal primer.

N. Anchorage Devices Powder Actuated: Minimum 0.177 inch diameter by 1-7/16 inch long fasteners in regular concrete and 0.145 inch diameter by 1-1/8 inch long fasteners in lightweight concrete. Allowable shear and tension values as permitted in ICBO Report No. 2388, 1639 or 1147, reduced to 80 percent.

O. Anchorage Devices, Drilled Expansion Anchors: Minimum 3/8 inch diameter with 2-1/4 inch embedment. Allowable shear and tension values as permitted in ICBO Report No. 1372, 2895 or 4627, reduced to 80 percent.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that overhead or concealed Work is completed, tested, inspected, and finished as required before starting Work of this section.

3.02 INSTALLATION

A. Walls and Partitions:

1. Fasten floor runners for exterior walls and interior partitions to concrete slab with required power driven fasteners. Spacing of fasteners not to exceed 24 inches on center. Fasten ceiling runners to structure as indicated on Section 09100, Top Track Fire-Rated System.

2. Sound insulated walls and partitions: Embed floor runner tracks in two beads of acoustical sealant or two runs of compressible tape seal. Install top track nested into slotted track system, in same manner for full height of walls. Where wall ends abutting concrete, masonry, or steel set end studs in two beads of acoustical sealant or two tape seals and secure at 4-foot centers vertically.

3. Space studs not over 16 inch on center unless indicated otherwise. Studs shall be located approximately 2 inches from door frame jambs, abutting partitions and partition corners, except those providing support for door and window openings.

4. Furnish and install manufacturer's standard floor track. Fasten track to floor by means of 1/4 inch x 1-1/4 inch Star "Dryvin" hammer drive anchors or 3/16 inch x 1 inch round head, "Rawl-Drives" one-piece expansion bolts spaced not to exceed 3 feet, and installed in drilled holes in slab, or to wood joist with nails as indicated. Track may be fastened to concrete floor slabs with, power-driven fasteners.

5. Studs shall be seated squarely in track with stud web and flanges abutting track web, plumbed and securely fastened with sheet metal screws, to flanges or web of both floor and top tracks. Provide 4 screws per stud.

6. Where there is no suspended ceiling, tops of stud walls shall be provided with track and shoes and be fastened as specified for floors. Welding of studs to ceiling track will not be permitted except where bearing studs are installed.

7. Over metal doorframes, install a cut-to-length section of runner track, with flanges slit and web-bent to allow flanges to overlap adjacent vertical studs, and securely fasten to studs. At doorjambs, extend studs continuous to structure above.

8. Bridging, or horizontal bracing of 1-1/2 inch, cold-rolled channels shall be fastened in a manner to prevent stud rotation. Bridging shall be furnished as follows: walls up to 10 feet high, one row at mid-height; walls exceeding 10 feet high, bridging or bracing rows spaced not to exceed 5 feet on center.

9. Wind bracing shall be fastened where indicated on Drawings. Minimum size of strap shall be as indicated on Drawings. Track where strap terminates shall be anchored as indicated on Drawings.

B. Plaster Ceiling Suspension System:

1. Provide horizontal furring in accordance with CBC Table 2511.1.1.

2. Hanger Wires:

a. Hanger wires for ceilings suspended from wood frame construction shall be installed in accordance with CBC Table 2511.1.1 and shall be fastened with stem lag screws in bottom edge of joists or rafters. Wire shall be looped through hole in stem lag screw and then wrapped twice around it. Stem lag screws shall be "Stanlag Screws" by Stanline, Inc., or equal, of type and penetration as follows:

Type Size	Hanger Wire	Screw Penetration, Minimum
Stanlag #SLS-3	#12 & #10	1-1/4 inch
Stanlag #SLS-375	#9 & #8	1-1/2 inch

b. Hanger wire shall be wrapped twice around runner channel, drawn up taut, and wrapped twice around itself.

3. Runner channels shall be installed 6 inches maximum from walls, parallel to runners. Splices in runner channels shall be provided at hangers only, by lapping channels not less than 12 inches and tying channels together at 2 points with a double wrap of tie wire twisted up taut.

4. Ends of runner channels abutting concrete or masonry surfaces shall be 1-1/4 inch clear and shall be tied to wall or partition with 3/4 inch channel brackets providing a 4-inch right angle bend secured with two 1/4 inch by 1 inch power-driven fasteners. Brackets shall extend from face of surface not less than 8 inches and shall be tied to runner channels at 2 points with double wrap of tie wire twisted up taut.

5. Securely saddle-tie furring channels to runner channels at each crossing with 16 gage tie wire twisted up taut, and with wings left uncut and bent back.

C. Gypsum Wallboard Ceiling Suspension and Framing: Suspended ceiling system framing shall be installed in accordance with ASTM C 754, and as follows.

1. Hangers shall be spaced not more than 48 inches along runner channels and 36 inches in other direction or 42 inches in both directions unless otherwise indicated. Locations of hanger wires shall be coordinated with other Work. Hangers at ends of runner channels shall be located not more than 6 inches from walls. Hanger wire shall be fastened to structural elements with required fasteners. Sags or twists, which develop in suspended system, shall be adjusted. Damaged or faulty parts shall be replaced.

2. Main Runners: Hanger wires shall be double strand saddle-tied to runner channels and ends of hanger wire shall be twisted three times around itself. Main runners shall be located to within 6 inches of parallel wall to support ends of cross furring. Main runners shall not come in contact with abutting masonry or concrete walls. Where main runners are spliced, ends shall be overlapped 12 inches with flanges of channels interlocked, and shall be securely tied at each end of splice with wire looped twice around channels.

3. Furring channels shall be fastened to runner channels and to structural supports at each crossing with tie wire, hairpin clips, or required fastenings. Furring channels shall be located within 2 inches of

parallel walls and beams, and shall be cut 1/2 inch short of abutting walls.

4. Ceiling Openings: Support members shall be provided as required at ceiling openings for access panels, recessed light fixtures, and air supply or exhaust. Support members shall be not less than 1-1/2 inch main runner channels and vertically installed suspension wires or straps shall be located to provide at least minimum support specified for furring and wallboard attachment. Intermediate structural members not a part of structural system, shall be provided for attachment or suspension of support members.

5. Light fixtures and air diffusers shall be supported directly from suspended ceiling runners. Wires shall be provided at required locations to support weight of recessed or surface mounted light fixtures and air diffusers.

6. Control Joints: Ceiling control joints for expansion and contraction shall be located where indicated on drawings. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

   a. Interior Ceilings With Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 50 feet in either direction or more than 2500 square feet in area.

   b. Interior Ceilings Without Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 30 feet in either direction nor more than 900 square feet in area.

D. Splay Wires and Compression Struts: Install as detailed and as required to prevent upward and sideward motion under seismic conditions, as required by code.

E. Suspension Under Ducts: For hangers spaced at 4 to 5-1/2 foot centers, provide 6 gage hanger wires with minimum 2 inch runner channels spaced at maximum 48 inch centers. For greater spans, design system for live load of l0 pounds per square foot of area plus dead load and provide a detail in Shop Drawings.

F. Furring: Provide framing for horizontal furring as shown or required. Conform to above requirements as applicable.

3.03 CONNECTIONS TO METAL DECKING

A. Provide pre-molded neoprene filler strips matching flute profile for non-fire-rated walls and partitions covered on one or both sides up to metal decking.

B. The top runner track of fire-rated partitions shall be a minimum of 20 gage and fastened to metal deck with required fasteners at spacing required for fire rating, but in no case over 16 inches on center. Neither wallboard nor metal

studs shall be fastened to top runner to allow for slab deflection. Areas above runner shall be friction fit with a minimum depth of 2-1/2 inch of 4 pounds per cubic foot mineral wool insulation. A minimum of 1/2 inch of firestopping compound shall be installed to each side of mineral wool insulation for 1-hour system, and 1 inch of firestopping for a 2-hour system. Install required special tracks, angles, fasteners and strips of gypsum wallboard as required to achieve required fire resistance rating.

C. Proprietary fire-rated top tracks are installed in accordance with manufacturer's recommendations and fire rating approval requirements.

3.04 CLEANING

A. Remove debris, rubbish, and waste material and legally dispose of off Project site.

3.03 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 24 00

PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Lath and Portland cement plaster and stucco as indicated.

2. Scratch coat plaster as a substrate for ceramic wall tile.

C. Related Sections:

1. Section 05 41 00: Load Bearing Metal Studs.

2. Section 09 22 16: Metal Support Assemblies.

3. Section 09 30 00: Tiling.

1.02 DESIGN REQUIREMENTS

A. Provide pre-formulated finish coat products that require only addition of clean water for mixing.

1.03 SUBMITTALS

A. Shop Drawings: Submit elevations and details indicating locations and types of components, splices, connections and accessory items. Indicate locations and types of framing substrates.

B. Material Samples: Submit minimum 48 inch x 48 inch samples of each stucco and Portland cement plaster texture for review. Samples shall be representative of texture, color, and proposed workmanship. Maintain reviewed Samples on Project site for reference.

C. Product Data: Submit manufacturer's catalog data for each material and component proposed for installation.

D. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

E. Mock-ups: Provide a mock-up at least 10 feet x 10 feet x 1 foot. Include at least one control joint and, corner condition and one window opening flashing. Locate where required by the Architect.

F. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants

1.04 QUALITY ASSURANCE

A. Coordinate with related Work to provide backing support for items mounted on finished surfaces and to provide allowances for pipes and other items in wall cavities.

B. Comply with the following ASTM Standard Specifications as a minimum requirement:

1. ASTM A641 – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

2. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM C150 – Standard Specification for Portland Cement.

4. ASTM C206 – Standard Specification for Finishing Hydrated Lime.

5. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring.

6. ASTM C842 – Standard Specification for Installation of Interior Gypsum Plaster.

7. ASTM C847 - Standard Specification for Metal Lath.

8. ASTM C897 – Standard Specification for Aggregate for Job Mixed Portland Cement-Based Plasters.

9. ASTM C926 – Standard Specification for Application of Portland Cement-Based Plaster.

10. ASTM C933 – Standard Specification for Welded Wire Lath.

11. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.

12. ASTM C1032 - Standard Specification for Woven Wire Plaster Base.

13. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

14. ASTM C1509 - Accessories for Gypsum Wallboard and Gypsum Veneer Base.

C. Exterior and Interior Lath: Where lath is fastened to wood supports, comply with CBC requirements.

D. Plaster: Conforming to requirements of the Portland Cement Plaster (Stucco) Manual published by the Portland Cement Association.

E. Metal Lath: NAAMM Standard ML/SFA 920 Guide Specifications for Metal Lath and Furring.

F. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

1. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

2. Adhesives and sealants shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect metal lathing and plastering materials before, during and after installation. In event of damage immediately provide required repairs and replacements.

B. Deliver and store Portland cement materials on the Project site in a manner to provide protection from exposure and damage by moisture. Pile materials to permit easy access for proper inspection and identification of each shipment. Stockpile adequate supplies of sand on the Project site to permit sampling and testing before installation. Store to avoid inclusion of foreign material.

C. Deliver plaster materials to the Project site in manufacturer's sealed and labeled packages.

PART 2 - PRODUCTS

2.01 LATH AND ACCESSORY MATERIALS

A. Each bundle of lath shall be sealed with a metal tag bearing the lath designation, weight and manufacturer's name.

B. Water Repellant Backing:

1. Weather-exposed for Horizontal Surfaces: W.R. Grace & Co., "Bituthene 4000" sheet, 0.060 inch thick, consisting of polyethylene sheet and rubberized asphalt, self-adhering, or equal.

2. Flashing and back-up for joints and reveals: W.R. Grace Co. VYCOR 0.040 inch thick rubberized asphalt, self-sealing and self-adhering, or equal.

C. Adhesives and sealers for water repellant backing: Types as recommended by manufacturer for installation with specified membrane sheet.

D. Expanded Metal Lath: ASTM C847, small diamond mesh expanded metal lath, 3.4 pounds per square yard, expanded from steel sheets with hot-dip galvanized coating G60 in accordance with ASTM A653. Lath shall be V-grooved self-furring type for installation over sheathing and flat type for installation over spaced framing. Install 3/8 inch ribbed lath when framing is over 24 inches on center.

E. Weather Barrier: Polypropylene Fabric Backing for Metal Lath - Tyvek, Typar, or equal.

F. Cornerite and Striplath: Flat or shaped lath reinforcing units, galvanized expanded metal weighing no less than 2.5 pounds per square yard, with 3 inch legs when formed for angle reinforcement and 2 inch minimum legs for galvanized wire type.

G. Plastering Accessories: Minimum 0.0172 inch galvanized steel or 0.0207 zinc alloy with expanded wings. PVC is not permitted. Furnish casing beads, expansion and control joints, weep and vent screeds.

1. Exterior Stress Relief Joints: Sizes and profiles, indicated or required. Control joints shall have expanded wings. Manufactured by Amico, Cemco, Dietrich, Keene or Superior.

    a. Expansion Joints: Two piece sections designed to accommodate expansion, contraction and shear forces.

    b. Control Joints: One-piece sections, with integral wings, installed as indicated on drawings, where cracks can be expected.

2. Drip Screed: Similar to Superior No. 10.

3. Casing Beads: Expanded flange type with minimum 7/8 inch grounds to establish plaster thickness.

4. Exterior Corner Reinforcement: Welded-wire type as manufactured by Stockton Products, Tree Island Industries Ltd. or Jaenson Wire.

5. Ventilating Screeds: Alabama Metal Industries, or equal, soffit vent screed, perforated web type, with integral plaster grounds.

6. Foundation Weep Screeds: Alabama Metal Industries, or equal, integral plaster ground and weep screed.

H. Fasteners:

1. Screws: USG corrosion resistant.

a. Type S or S-12 for metal studs.

b. Type A for wood and metal studs 20-25 gauge.

2. Wire for fastening lath to metal framing, fastening lath together and fastening corner beads, metal grounds and base screeds to lath and framing shall be 18 gage, galvanized conforming with ASTM A641.

3. Nails: 11 gage galvanized roofing nails, 7/16 inch head, barbed shanks, 1-1/2 inch long for horizontal application and providing a minimum of 3/4 inch penetration for vertical surfaces. Furnish fiber wadded furring nails for attaching lath to wood sheathing unless self-furred type of plaster reinforcement is approved.

4. Power driven nails shall be used for attaching lath to concrete and concrete masonry. Nails shall be a code recognized fastener such as Pneutek, Inc. fasteners or approved equal. Each fastener shall provide minimum withdrawal resistance of 50 pounds minimum.

5. Staples: Minimum 3/4 inch crown, 16 gauge galvanized steel. Staples shall have sufficient length to penetrate studs at least 3/4 inch.

I. Wire: Galvanized soft-annealed steel wire in conformance to ASTM A641.

1. Hanger wire for suspended ceilings, minimum 9 gauge.

2. Wire for fastening metal channels together, 16 gauge.

3. Wire for fastening lath to supports, tying ends and edges of lath sheets, and securing accessories to lath, 18 gauge.

2.02 PLASTER MATERIALS

A. Portland Cement: ASTM C150, Type II, low alkali.

B. Hydrated Lime: ASTM C206, Type S.

C. Sand: Washed natural sand conforming to ASTM C897, except gradation of sand shall be as follows:

Percentage retained, each sieve, by weight:

Sieve Size	Maximum	Minimum
No. 4	0	0
No. 8	10	0
No. 16	40	10
No. 30	65	30
No. 50	90	70
No. 100	100	95

D. Water: Clean, potable and from domestic source.

E. Exterior Finish Coat Plaster: Shall consist of one of the following systems:

1. Three Coat Systems: Mineral Stucco as fabricated by California Stucco, La Habra, Highland Stucco, Merlex, Omega Stucco, Inc, or equal. Furnish formulations requiring only addition of water for installation. Sand shall pass No. 20 sieve. Mix and sand shall provide specified finish. Furnish integral colored stucco in color as selected by Architect.

F. Plaster Bonding Agent: "Weld-Crete", manufactured by Larsen Products Co., Upco/Div., Emhart Corp. Bonding Adhesive No. 705, or Merlex Stucco "Acrylex".

G. Base Coat Reinforcement: Alkali resistant fiberglass shorts, 1/2 inch chopped strands, Type AR, manufactured by OCF, PPG Industries, or equal.

H. Plaster Patching Materials:

1. Bonding Agent: Acrylic resin type, Acryl 60, LHP Bonder, or equal.

2. Patching Plaster: Manufactured by Merlex Stucco, Inc., Orange, CA, or equal. Furnish fast setting, compatible with existing plaster materials, "Exterior Pronto Patch," Portland cement base coat material, requiring only addition of water. Material shall provide initial set within 20 minutes, and final set within one hour.

I. Underlayment: Single ply self-adhesive waterproofing membrane as manufactured by W.R. Grace Company, Jiffy-Seal by Protecto Wrap, or equal. Furnish for installation behind stress relief joints and backing on horizontal and vertical surfaces exposed to weather; under metal copings and flashings; and window jambs and sills.

J. Miscellaneous Material: Provide additional components and materials required for a complete installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that overhead or concealed Work is finished, completed, tested and inspected as required before starting Work of this Section.

3.02 INSTALLATION-WEATHER BARRIER MEMBRANE

A. Install one layer of underlayment over areas to receive lath with weather barrier membrane. Install horizontally with each course weather lapped 2 inches over layer below and 6 inches on ends.

B. Install lath over underlayment in accordance with manufacturer's instructions. Repair and seal tears and holes in weather barrier prior to applying plaster.

C. Install single ply self-adhesive waterproofing membrane per manufacturer's recommendations in areas indicated on the Drawings.

D. Flashing Around Openings: Install self-adhering, self-sealing membrane to make openings weather tight in accordance with details shown on drawings.

3.03 LATH INSTALLATION

A. General: Where exterior and interior lath is fastened to horizontal wood supports, the current edition of the CBC shall be complied with. Refer to Section 01420: Testing and Inspection.

B. Exterior Lathing, General: Comply with requirements of ASTM C1063 and ML/SFA 920, whichever is more restrictive.

1. Application of Metal Lath: Metal lath or wire fabric lath shall be installed in accordance with the provisions of CBC current editions. Lath shall be furred out from vertical supports or backing not less than 1/4 inch.

2. Self-furring lath meets furring requirements. Furring of expanded metal lath is not required on supports providing a bearing surface width of 1-5/8 inch or less.

3. Where external corner reinforcement is not installed, lath shall be furred out and carried around corners, extending and fastened to at least one support.

4. A weep screed shall be provided at or below foundation plate line on exterior stud walls. Screed shall be installed a minimum of 4 inches above grade and shall be of a type permitting water to drain to exterior of building. Weather-resistant barrier and exterior lath shall cover and terminate on attachment flange of screed.

5. Ends of lath on open framing (unsheathed) shall occur over supports. Where necessary, install additional studs to provide support for lath ends and support for separate flanges of stress relief joints.

3.04 PLASTER APPLICATION - GENERAL

A. Proportion, mix, apply and cure plaster in conformance with ASTM C926.

B. Install each plaster coat to an entire wall or ceiling panel without interruption to avoid cold joints and abrupt changes in uniform appearance of succeeding coats. Wet plaster shall abut existing plaster at naturally occurring interruptions in plane of plaster (such as corner angles, openings and control joints) wherever possible. Cut joining, where necessary, square and straight and at least 6 inches away from a joining in preceding coat.

C. Provide sufficient moisture or curing methods to permit continuous and complete hydration of cementitious materials, considering climatic and Project site conditions. If water cured, each basecoat shall be continuously damp for at least 48 hours, including weekends and holidays. Other curing methods, spray applied curing compounds such as Expo-Cure, or OEHS approved equal are permitted.

D. Provide sufficient time between coats to permit each coat to cure or develop enough rigidity to resist cracking or other damage when next coat is installed.

3.05 EXTERIOR PLASTERING

A. Concrete surfaces, except where noted as "Exposed Concrete" or "Painted Concrete," shall be finished with stucco dash finish coats, as specified.

B. Preparation of Surfaces:

1. Exterior concrete and masonry surfaces to be plastered shall be free of oily or waxy substances, and loose or foreign material. Uniformly spray with nozzle-type water spray at least 12 hours before installation of plaster.

2. Concrete and masonry surfaces to receive two coat application of 5/8 inch thick Portland cement plaster shall be treated with bonding agent. This surface preparation shall not be installed instead of a brown coat of plaster.

3. Concrete surfaces to receive stucco dash finish shall be lightly sandblasted to provide a roughened surface.

4. Verify that lath has been installed securely and that grounds, screeds, casing beads and other accessories are straight, in correct position, and securely fastened in place.

C. Number of Coats and Thickness: Exterior plaster shall be portland cement as follows with minimum thickness from face of supports or surfaces to finish face of plaster as follows:

1. Lathed Surfaces:

a. 3 coats, scratch, brown and finish, 7/8 inch thick, one inch thick where required by CBC.

b. 2 coats, controlled pre-mix single base coat and finish, 7/8 inch thick, one inch thick where required by CBC.

2. Stucco Dash Finish Coats: 2 coats, 1/8 inch thick.

3. Concrete and Masonry Base: 2 coats, brown and finish, 5/8 inch thick.

D. Proportions:

1. Proportion ingredients for Portland cement. Calibrated boxes are required to determine the accuracy of proportioning. Proportions shall adhere to current edition of CBC.

2. Dash Bond Coat: Mixed in the proportion of 1 cubic foot of standard portland cement to 1-1/2 cubic feet of sand. Omit dash coat when bonding agent is used.

3. Stucco Finish: Stucco shall be factory prepared, exterior type, colored stucco containing a portland cement base, required aggregates and mineral pigments. Colors shall be as selected by the Architect. Selected colors are not limited to standard stock colors and certain Work, such as ceilings, soffits and walls, may be finished in non-standard colors as selected.

4. Acrylic Based Stucco Finish: Shall be factory prepared exterior type, acrylic based colored stucco finish. Colors and textures shall be as selected by the Architect.

E. Mixing: Provide plaster mix: cementitious materials and aggregate in proportions specified, furnishing only sufficient water to obtain proper consistency before installation. Do not mix any more material at any time than can be installed within 1/2 hour after mixing. Do not allow material to remain in mixer or mixing boxes overnight. Maximum allowable slump shall be 2-1/2 inch, based on a 2 inch by 4 inch by 6 inch slump cone.

F. Application:

1. Dash Bond Coat: Dash on concrete or masonry surfaces, leave undisturbed, and maintain damp for at least 24 hours following installation. Omit Dash bond coat when liquid bonding agent is used.

2. Scratch Coat: Install with sufficient material to completely cover laths and scratch across supports.

3. Brown Coat: Rod to a straight, true, even within 1/8 inch tolerance in 5 feet of surface and float to receive finish coat.

4. Single Base Coat: As an alternative to scratch and brown coats, apply in conformance to ASTM C926.

5. Stucco Finish Coat: Install in 2 coats to a total thickness of 1/8 inch, each coat covering surface uniformly. First coat shall completely cover basecoat with uniform color. Second color shall provide a uniform texture.

   a. First coat shall be installed by providing several passes with nozzle to completely cover surface.

   b. The second coat shall be installed by doubling back same day, when first coat is sufficiently dry.

   c. Over concrete surfaces, second coat shall be installed 24 hours after installation of first coat. In warm weather, first coat shall be cured by light water spray after material has set.

   d. Protection: Protect those surfaces, which are not to receive dash finish coats. Such surfaces shall be shielded and shall have any sand left from dashing operation removed.

G. Curing Exterior Plaster: Adhere to current edition of CBC for curing requirements.

H. Option for Machine Application, Scratch and Brown Coats, or Single Base Coat: Instead of hand installed plaster, the furnishing of plastering machines for interior or exterior scratch and brown coats or single base coat is permitted. Machine installation shall be in accordance with the following:

1. Qualifications: Provide proper equipment and apparatus.

2. Apparatus: Pump shall be equipped with an air pressure gage and required safety devices. Hoses and connections shall be tight and pressure shall be maintained constant.

3. Tests: Tests for determining proper consistency of plaster mix shall be taken at nozzle using slump cone method. Tests shall be observed by the IOR at least twice each day and as often as deemed necessary. Perform required tests and maintain an accurate log of such tests to ascertain compliance with material slump requirements. Material slump shall not exceed 2-1/2 inches at nozzle. Furnish an adequate number of standard 2 inch x 4 inch x 6 inch slump cones for testing. Cones shall be on the Project site before Work is started and at all times during performance of the Work of this section.

4. Proportion and Application: Proportioning, mixing, number of coats and thickness shall be same as specified for hand application. Cement aggregate and water shall be mixed to plaster machine. Plaster mix shall be projected into and conveyed through a hose to the nozzle at end of hose and deposited by pressure in its final position ready for manual straightening and finishing.

5. Follow-Up: Perform scoring operation of plaster, based on settings and drying conditions at time of installation. Curing shall be as previously specified.

6. Protection: Before installing any plaster, thoroughly protect other adjacent Work.

3.06 QUALITY CONTROL

A. Finish interior and exterior plaster to a uniform texture, free of imperfections and flat within 1/8 inch in 5 feet. Form a suitable foundation for paint and other finishing materials. Avoid joining marks in finish coats.

3.07 TESTING

A. Written certification of sand compliance is required. Samples of sand shall be obtained at the Project site. Tests may be performed as deemed necessary by the IOR.

B. When plastering machine is used, provide a supply of 2 inch x 4 inch x 6 inch high cones for slump testing of Portland cement plaster. Samples of plaster taken at nozzle shall have a maximum slump of 2-1/2 inches. Plaster material not complying with this requirement shall be deemed as defective Work.

3.08 REPAIR REQUIREMENTS FOR DAMAGED PLASTER

A. Plaster Detached from Framing:

1. Remove loose and broken plaster.

2. Repair or replace damaged water-resistant backing and lath in compliance with specified standards.

3. Remove stucco finish from surrounding area in the same plane by sandblasting.

4. Install a scratch coat and a brown coat mixed with liquid bonding agent instead of water to the areas devoid of plaster.

5. Install a coat of liquid bonding agent to entire wall plane.

6. Install a 1/8 inch thick stucco finish coat to entire wall plane and match existing texture and color.

B. Cracked Plaster 1/8 inch to 1/2 inch:

1. Remove loose material from crack with a wire brush.

2. Fill crack with slurry of stucco and liquid bonding agent.

3. Install a coat of liquid bonding agent to entire wall plane.

4. Install 1/8 inch thick stucco finish to entire wall plane and match existing texture and color.

C. Cracks Larger Than 1/2 inch - Painted:

1. Remove loose material from crack with a wire brush.

2. Fill crack with slurry of one part portland cement to 3 parts masonry/stucco sand and liquid bonding agent to match existing texture of adjacent surface.

3. Paint entire wall plane, color to match existing.

4. Where patching of plaster over existing lath is feasible, fasten loose lath and install new lath with nails at 6 inch centers. Where metal is furnished, lap new lath over existing 6 inches and tie at 6 inch centers. Install paper backings as required, shingled into existing..

5. Patching of Holes, Cracks, and Gouges: Holes, cracks, gouges, missing sections, and other defects in existing improvements shall be patched. For holes over 1 inch in size, cut small sections of lath and place in opening attached to existing material. Install 3 coats of plaster. For holes one inch and smaller, install bonding agent to existing surfaces and neatly fill hole with plaster, installing necessary coats to match adjacent surfaces, eliminate cracks and match existing surface texture. Cracks, gouges, and other defects shall be filled with plaster or spackle as required and neatly finished to match adjacent existing improvements.

3.09 CLEANING

A. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

3.10 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Gypsum board, sheathing and tile backer systems and accessory components as indicated.

C. Related Sections:

1. Section 05 41 0: Load Bearing Metal Studs.

2. Section 07 92 00: Joint Sealants.

3. Section 09 22 16: Metal Support Assemblies.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Provide systems capable of resisting deflection as required by CBC and authorities having jurisdiction.

B. Regulatory Requirements: Comply with CBC requirements for design and installation.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating complete suspension system including connections, anchorage, and trim features.

B. Material Samples: Submit 18 inch x 18 inch Samples of the texture coat of gypsum board panels with edges taped.

C. Product Data: Submit manufacturer's catalog data for each product proposed for installation.

D. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants and CHPS EQ2.2.6 for materials.

1.04 QUALITY ASSURANCE

A. Comply with following as a minimum requirement:

1. ASTM C474 - Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction.

2. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

3. ASTM C514 – Standard Specification for Nails for the Application of Gypsum Board.

4. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.

5. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications.

6. ASTM C954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 inch to 0.112 inch in Thickness.

7. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

8. ASTM C1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

9. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

10. ASTM C1178 – Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

11. ASTM 1325 – Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.

12. ASTM C1396 – Standard Specification for Gypsum Board.

13. ASTM C1629 - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

14. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

15. ASTM D3274 - Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation.

16. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

17. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

18. ASTM E695 - Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.

19. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

20. Underwriters Laboratories (ULI) requirements and listings for fire-rated materials and products classification.

21. GA 214 - Gypsum wallboard finish shall conform to requirements of GA 214, Application and Finishing of Gypsum Panel Products, published by the Gypsum Association, and as specified herein.

22. GA 600 - Gypsum wallboard shall conform to requirements of GA 600 Fire Resistance Design Manual, published by the Gypsum Association.

23. American National Standards for the Installation of Ceramic Tile.

24. ANSI A118.9 - Specification for Cementitious Backer Units.

B. Qualifications: Installer shall have a minimum 5 years experience in installing and finishing gypsum board.

C. Panel materials shall meet the requirements of CHPS EQ2.2.6:

1. CHPS Low-Emitting Materials Table: Materials submitted must be listed as low emitting on the CHPS website, www.CHPS.net, or must be tested by an independent laboratory as prescribed by CHPs.

2. Materials shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

D. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

1. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

2. Adhesives and sealants shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH)

Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, factory sealed packages, containers or bundles bearing brand name and name of manufacturer.

B. Materials shall be kept dry. Gypsum wallboard shall be neatly stacked flat; avoid sagging and damage to edges, ends, and surfaces.

C. Fire-rated materials shall have fire classifications numbers attached and legible.

D. Provide all means necessary to protect gypsum board systems before, during, and after installation.

E. Gypsum wallboard showing any evidence of water damage shall not be installed. Gypsum wallboard showing evidence of water damage after installation shall be removed and replaced.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Georgia-Pacific, National Gypsum Co., U.S. Gypsum Co., James Hardie, or equal.

2.02 MATERIALS

A. Gypsum Board Type X (fire-resistant): 5/8 inch thick, 4 feet wide and up to 16 feet long conforming to ASTM C1396 with long edges tapered.

GYPSUM BOARD SYSTEM			
Panel	**Fasteners**	**Joint Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8" Sheetrock regular, type X, Firecode Core, or Firecode C Core Gypsum panels, as required by UL design.	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S or S-12 drywall screw.	Sheetrock paper tape Heavy Duty to meet ASTM C 475.	Sheetrock Setting Type, Lightweight Setting, Sheetrock Taping, Topping, or All-Purpose, Sheetrock Ready-Mixed Taping, Topping, or All-Purpose, or Sheetrock Lightweight All-Purpose or Ready-Mixed - Plus 3

Georgia-Pacific: 5/8" ToughRock regular, Fireguard or Fireguard C gypsum, as required by UL design.	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S or S-12 drywall screw.	Sheetrock paper tape Heavy Duty to meet ASTM C475.	Same as above
National Gypsum Co.: 5/8" Gold Bond regular, Fire-Shield or Fire-Shield C gypsum wallboard, as required by UL design.	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S or S-12 drywall screw.	ProForm Joint Tape, ProForm Multi-Flex Tape Bead, ProForm Fiberglass Mesh Tape to meet ASTM C 475.	. ProForm Multi-Use, ProForm All Purpose, ProForm Lite, ProForm Ultra, ProForm Taping, ProForm Triple-T, ProForm Topping, or ProForm Sta-Smooth, Sta-Smooth Lite, Sta-Smooth HS Joint Compound.

B. Impact Resistant Gypsum Board, Type X (fire-resistant): 5/8 inch thick, 4 feet wide and up to 16 feet long complying with one of the following:

1. Fire resistant rated gypsum core with additives to enhance impact resistance, faced with moisture and mold resistant paper, and complying with ASTM C1396.

2. Fire resistant, high density paperless gypsum with reinforcing fiber mesh.

3. Fire resistant fiberglass-mat faced gypsum board panels

GYPSUM BOARD IMPACT RESISTANT SYSTEMS			
Panel	**Fasteners**	**Joint. Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8" Fiberock VHI Gypsum fiber panels.	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S-12 drywall screw.	Sheetrock paper tape Heavy Duty.	Sheetrock Setting compound.
Georgia-Pacific: 5/8" DensArmor Plus Impact Resistant Panels	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S-12 drywall screw.	Glass mesh.	Same as above.
National Gypsum Co.: 5/8" Hi-Impact XP gypsum wallboard.	Wood: 1 ¼"Type W drywall screws. Steel: 1 ¼" Type S-12 drywall screw.	ProForm joint tape.	Proform XP all-purpose joint compound.

C. Mold and Water Resistant Gypsum Board, Type X (fire-resistant): (Use at elevator shaft interior, and at restrooms above tile backer board), 5/8 inch thick 48 inch wide, up to 16 feet long conforming to ASTM C1396 with long edges tapered.

1. Resistance to Mold Growth: Minimum score of "10" when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.

2. Resistance to Fungi: Maximum score of "0" when tested in accordance to ASTM G21.

GYPSUM BOARD MOLD RESISTANT SYSTEM			
Panel	**Fasteners**	**Joint Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8" Sheetrock Mold Tough, Firecode Core, or Firecode C Core Gypsum panels.	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S or S-12 drywall screw.	Glass Mesh.	Setting-type joint compound rated 10 when tested in accordance with ASTM D3273 and evaluated in accordance with ASTM D3274.
Georgia-Pacific: 5/8" Dens Armor Plus Fireguard or Fireguard C Interior Panels (Fire-Rated).	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S or S-12 drywall screw.	Same as above.	Same as above.
National Gypsum Co.: 5/8" Gold Bond XP regular, Fire-Shield or Fire-Shield C gypsum wallboard.	Wood: 1 ¼" Type W drywall screws. Steel: 1 ¼" Type S or S-12 drywall screw.	Same as above.	Same as above.

D. Gypsum Liner, Type X (fire-resistant): 1 inch thick 24 inch wide, up to 14 feet long, conforming to ASTM C1396 or C1658.

1. Resistance to Mold Growth: Minimum score of "10" when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.

2. Resistance to Fungi: Maximum score of "0" when tested in accordance to ASTM G21.

GYPSUM BOARD SHAFTWALL SYSTEMS			
Panel	**Fasteners**	**Joint. Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8" Mold Tough Type X Firecode Core, Gypsum panels, 3/4" Mold Tough Ultracode Core and 1" Mold Tough Liner panels.	1 ¼", 1 5/8", or 2 ¼" Type S or S-12 drywall screw.	Glass Mesh.	Setting-type joint compound rated 10 when tested in accordance with ASTM D3273 and evaluated in accordance with ASTM D3274.
Georgia-Pacific: 5/8" ToughRock Fireguard, or ToughRock Fireguard, C gypsum board or DensArmor Plus Fireguard or Fireguard C Interior Panels (Fire-Rated) and 1" DensGlass Ultra Shaftliners panels.	1 ¼", 1 5/8", or 2 ¼" Type S or S-12 drywall screw.	Same as above.	Same as above.
National Gypsum Co.: 5/8" Gold Bond regular, Fire-Shield or Fire-Shield C gypsum wallboard and 1" Gold Bond Fire-Shield Shaftliner.	1 ¼", 1 5/8", or 2 ¼"Type S or S-12 drywall screw.	ProForm XP all-purpose joint compound.	Same as above.

E. Tile Backer Board, Type X (fire-resistant) @ restrooms and janitor closets:

1. Water resistant panels, 5/8 inch thick, 4 feet wide and up to 8 feet long conforming to conforming to one of the following requirements:

   a. Aggregated Portland cement board with polymer-coated, woven glass-fiber mesh embedded in front and back surfaces.

   b. Fiberglass-mat faced gypsum backing board complying with ASTM C1178.

   c. Cementitious board surfaced with fiberglass reinforcing mesh on front and back and complying with ANSI A118.9 and ASTM C1325.

2. Tile backer boards shall meet the following requirements:

   a. Resistance to Mold Growth: Minimum score of "10" when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.

   b. Resistance to Fungi: Maximum score of "0" when tested in accordance to ASTM G21.

TILE BACKER BOARD SYSTEMS			
Panel	**Fasteners**	**Joint. Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8" DUROCK Cement Board.	Wood: 1 1/2" galvanized roofing nails or 1 1/4" 1 5/8", or 2 1/4" DUROCK No. 8 wood screws. Steel:1 1/4" or 1 5/8" DUROCK No. 8 screws.	DUROCK glassfiber tape.	ANSI A136.1 Type I: Organic adhesive or ANSI A118.1acrylic latex modified dry-set mortar or ANSI A118.4 Latex Portland cement mortar.
Georgia-Pacific: 5/8" DensShield Fireguard Tile Backer.	Wood: 1 3/4" galvanized roofing nails or 1 5/8" Buglehead corrosion resistant, course thread, drywall screws. Steel: 1 1/4" Buglehead, corrosion resistant, fine thread, drywall screws.	2" wide fiberglass mesh tape.	ANSI A136.1 Type I: Organic adhesive or ANSI A118.1 acrylic latex modified dry-set mortar or ANSI A118.4 Latex Portland cement mortar.
National Gypsum Co.: 5/8" PermaBase Brand Cement Board.	Wood: 1 1/2" galvanized roofing nails or 1 1/4" or 1 5/8", PermaBase corrosion resistant screws. Steel: 1 1/4" or 1 5/8" Type S-12 screws.	PermaBase mesh tape. 2" wide polymer-coated (alkali resistant) mesh tape for interior applications. 4" wide polymer coated (alkali resistant) mesh tape for exterior applications.	Treat joints andset facing material with latex-Portland cement mortar or dry-set (thin-set) mortar. Mortars shall comply with ANSI A118.1 or A118.4 standards. Type I organic adhesive meeting ANSI A-136.1 for interior use only.
James Hardie Building Products Inc.: 1/2" or ¼" Hardibacker 500 Cement Board (for floor and countertop application at existing schools only).	Wood: 1 1/2" galvanized roofing nails. Wood and Steel: 1 1/4" No. 8 by 0.375 HD self drilling, corrosion resistant ribbed wafer head screws.	2" Wide High Strength. Coated, alkali-resistant, glass fiber reinforcing tape.	ANSI A136.1 Type I: Organic adhesive or ANSI A118.1acrylic latex modified dry-set mortar or ANSI A118.4 Latex Portland cement mortar.

F. Gypsum Sheathing, Type X (fire-resistant): 5/8 inch thick, 4 feet wide and up to 10 feet long fiberglass-mat faced gypsum backing board complying with ASTM C1177 or ASTM C1178.

1. Resistance to Mold Growth: Minimum score of "10" when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.

2. Resistance to Fungi: Maximum score of "0" when tested in accordance to ASTM G21.

GYPSUM BOARD SHEATHING SYSTEMS			
Panel	**Fasteners**	**Joint. Tape**	**Joint Treatment**
United States Gyp. Co.: 5/8" Securock Glass-Mat Sheathing.	Wood: 1 ¼" # 6 buglehead corrosion-resistant fasteners. Steel: 1 ¼" Type S-12 drywall screw.		

Georgia-Pacific: 5/8" Densglass Gold Type "X"	Wood: 1 ¼" # 6 buglehead corrosion-resistant fasteners. Steel: 1 ¼" Type S-12 drywall screw.		
National Gypsum Co.: Gold Bond Brand e^2XP Fire-Shield Extended Exposure Gypsum Sheathing.	Wood: 1 ¼" # 6 buglehead corrosion-resistant fasteners. Steel: 1 ¼" Type S-12 drywall screw.		

2.03 ACCESSORIES

A. Metal Trim: Paper-faced metal drywall beads and trim meeting ASTM C1047, as manufactured by USG/Beadex, National Gypsum, or equal. Trim units shall be of size and type to fit gypsum board construction and shall include corner beads, casings, edge trim and other shapes indicated and required.

B. Mold Resistant Joint Compound: As recommended by board manufacturer, OnePass by CTS Cement Manufacturing Co., or equal, meeting the following requirements:

1. Minimum score of "10" when tested in accordance with ASTM D3273 and evaluated in accordance with ASTM D3274.

2. Shall conform to ASTM C475.

C. Joint Tapes: Shall conform to ASTM C475.

D. Finishing Materials:

1. High solids primer shall be SHEETROCK Brand First Coat manufactured by USG or High-build primer by Sherwin Williams, or equal.

2. Texture coat finish material shall be manufactured by U.S. Gypsum, Hamilton, or Highland Stucco and Lime Products, Inc., or equal.

E. Acoustical Sealant: Non-hardening, non-shrinking, for use in conjunction with gypsum board, as recommended by Board Manufacturer and conforming to ASTM C919.

F. Fasteners:

1. Self-drilling, self-tapping bugle-head drywall screws; in conformance to ASTM C1002. No. 6 Type S or S12, 1 1/4 inch long for metal framing,

2. Wood framing:

a) Nails: Hot dip, 11 gauge galvanized nails with 7/16 inch head and 1-1/4 inch minimum length.

b) Screws: Type W 1-1/4 inch minimum length for single-layer panels. Screws shall be furnished with a corrosion-resistant treatment.

3. Adhesive: as recommended by board manufacturer and in compliance to ASTM C557.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Metal Trim:

1. Provide corner beads at outside corners and angles, metal casing where gypsum board terminates at uncased openings, metal edge trim where board edges abut horizontal and vertical surfaces of other construction.

2. Install trim in accordance with manufacturer's directions with appropriate joint compound. Install trim in longest practical pieces.

B. Gypsum Board:

1. Install gypsum board in conformance with ASTM C840.

2. Gypsum board shall be cut by scoring and breaking or by sawing, working from face side. Where board meets projecting surfaces it shall be scribed and neatly cut. Unless conditions require otherwise, gypsum board shall be installed first to ceilings, then to walls. End joints shall occur over a support. Install panels of maximum practical length so a minimum number of end joints occur.

3. End joints shall be staggered and joints on opposite sides of a partition shall be arranged to occur on different studs. Joint layout at openings shall be installed so no end joints will align with edges of openings.

4. Except where specified otherwise, fasteners shall be spaced not less than 3/8 inch from edges and ends of gypsum board. Do not stagger fasteners at adjoining edges and ends.

5. Install gypsum board vertically or horizontal as permitted by specific UL Design at walls. Fasten board with drywall screws spaced not to exceed 8 inch on centers around perimeter of boards and 8 inches on centers on intermediate studs. Space screws at 8 inches on centers along top and bottom runners. Screws shall be driven to provide screwhead penetration just below gypsum board surface without breaking surface paper. Where

electrical outlet and switch boxes are indicated, provide adjustable attachment brackets between studs.

6. Install gypsum board to ceiling framing with long dimension at right angles to furring channels, or wood framing members, and fasten with specified drywall screws or nails spaced 6 inch to 7 inch on centers across board. Screws or nails shall be not less than 1/2 inch from side joints and 3/8 inch from butt end joints. Abutting end joints shall occur over furring channels and end joints of boards shall be staggered. Support cutouts or openings in ceilings with furring channels.

7. Install access doors, furnished under another section, in correct location, plumb, or level, flush with adjacent construction, and securely fastened to framing.

3.02 TOLERANCES

A. Install gypsum board flat within 1/8 inch in 10 feet.

3.03 JOINT TREATMENT AND FINISHING

Level	Joints	Interior Angles	Accessories	Fasteners	Surface
1	Tape set in compound	Tape set in joint compound			Tool marks and ridges acceptable
2	Tape set in joint compound and one separate coat of joint compound	Tape embedded in joint compound and wiped to leave a thin coat of compound over tape, and one separate coat	Covered by one separate coat of joint compound	Covered by one separate coat of joint compound	Free from excess joint compound. Tool marks and ridges acceptable.
3	After taping, cover with two separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 2 separate coats of joint compound	Smooth and free of tool marks and ridges *
4	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *
5	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Skim coat of joint compound applied to entire surface. Surface free from tool marks and ridges. *

*At completion of specified taping and finishing, install one coat of high solids primer as specified hereafter

B. All Levels: Install tape bedding compound, tape, and finishing cement on joints in wallboard as required for specified levels of finish.

C. Levels 2 through 5:

1. Install joint cement and finishing cement over screw heads. Treat all inside corners with joint cement, tape, and finishing cement. Treat outside corners with corner beads and finishing cement.

2. Provide metal casing beads at all edges of gypsum wallboard, which abut ceiling, wall, or column finish, and elsewhere as required, such as openings, offsets, etc. Install all exposed joints, trims, and attachments non-apparent following installation of paint or other finishes. If joints and fasteners are visibly apparent, correct defects as required.

3. Seal raw edges of plumbing openings and boards that have been cut to fit with sealing compound brushed on.

4. When entire installation is completed, correct and repair broken, dented, scratched or damaged wallboard before installation of finish materials by other trades.

D. Levels 3 and 4: Install one coat of high solids primer over entire surface.

E. Level 5: Install one coat of skim coat over entire surface, followed by one coat of high solids primer over entire surface.

3.04 REQUIRED LEVELS OF FINISH

A. Unless otherwise indicated or specified, levels of finish required shall be as follows:

1. Level 1: Plenum areas above ceilings, insides of shafts, and other concealed areas. Taping to be as required for fire rated assemblies.

2. Level 2: Water-resistant wallboard backing for high moisture areas to be covered with a water resistant surface other than tile, vinyl or paint, i.e stainless steel cladding etc.

3. Level 3: Backing for vinyl wall covering and adhered acoustic tile. Also, provide where textured finish is indicated.

4. Level 4: Exposed painted wallboard in classrooms, utility rooms, and similar spaces not requiring Level 5 finish.

5. Level 5: Exposed, painted wallboard in offices and corridors.

3.05 TEXTURE COAT

A. Spray install texture coat to interior gypsum board surfaces where indicated on Drawings.

B. Texture coat shall provide a uniform splatter pattern finish with an 80 percent minimum coverage of surface.

C. Provide protection from spray for interior surfaces of electrical boxes and wiring.

3.06 CLEAN-UP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.07 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Ceramic tile.

2. Quarry tile.

3. Waterproof membrane for tile.

4. Stone thresholds.

5. Mortar setting beds for floor and wall tile.

C. Related Sections:

1. Section 03300: Cast-In-Place Concrete.

2. Section 09220: Portland Cement Plaster and Metal Lath.

3. Section 06100: Rough Carpentry

4. Section 09250: Gypsum Board

5. Section 07920: Joint Sealants

1.02 SUBMITTALS

A. Product Data: Manufacturer's data, standard specifications, Material Safety Data Sheets, and other technical information for each product specified.

B. Material Samples: Manufacturer's standard palette, indicating full range of tile colors, textures, and grout colors.

C. Mock-Ups: For each type, color, and texture, minimum 1' x 1' or three full tile courses, on plexiglass to demonstrate proper bond mortar and coverage; grout color, hardness and depth.

D. Installation Instructions: Manufacturer's preparation and installation instructions.

E. Product Certificates: Signed by manufacturer certifying that products furnished comply with requirements of this Specification.

F. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants.

1.03 QUALITY ASSURANCE

A. Comply with applicable parts of the following codes or standards as a minimum requirement:

1. ANSI A108, American National Standard Specifications for the Installation of Ceramic Tile.

2. ANSI A118, American National Standard Specifications for Ceramic Tile Installation Materials.

3. ANSI A136.1, Standard Specifications for Ceramic Tile.

4. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

5. ASTM C185 - Standard Test Method for Air Content of Hydraulic Cement Mortar.

6. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

7. ASTM C150 - Standard Specification for Portland Cement.

8. ASTM C241 - Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.

9. ASTM C206 - Standard Specification for Finishing Hydrated Lime

10. ASTM C503 - Standard Specification for Marble Dimension Stone.

11. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.

12. ASTM D4551 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane.

13. Tile Council of America (TCA) – Current edition of "Handbook for Ceramic Tile installation".

B. Grade Certificate and Labeling: With each delivery of tile, furnish manufacturer's "Master Grade Certificate" to IOR.

C. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

D. Consistent Quality: Products shall be consistent in appearance and physical properties.

E. Comply with all requirements of California Building Code and ADA.

F. Qualifications of Tile Manufacturer: Company specializing in ceramic tile, mosaics, pavers, trim units, and thresholds with five years minimum experience.

G. Qualification of Installation System Manufacturer: Company specializing in installation systems/ mortars, grouts/ adhesives with ten years minimum experience.

H. Qualifications of Installer: Company specializing in installation of ceramic tile, mosaics, pavers, trim units and thresholds with five years experience with installations of similar scope, materials, and design.

I. Pre-Construction Meetings: Prior to start of Work of this section and after approval of submittals, schedule an on-site meeting between Contractor, OAR, IOR, and representatives of the material manufacturer and tile installer to review construction conditions and Drawings for conformance with the requirements of this Specification for each substrate.

J. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

   A. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

   B. Adhesives shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver tile and other materials in sealed containers, with manufacturer's labels intact.

B. Keep all materials clean and dry.

1.05 MAINTENANCE

A. Extra Materials: Provide a minimum of 5 percent of each type and color as the installed tile, in manufacturers' cartons and labeled.

1.06 WARRANTY

A. Manufacturer shall provide a 5 year material warranty.

B. Installer shall provide a 5 year labor warranty.

C. For waterproofing, manufacturer shall provide a 10 year material warranty for waterproofing installation, tile setting, and grouting materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Tile: To establish quality, Specification is based on ANSI A137.1 Standard Grade. Equivalent tile products from the following manufacturers may be provided:

1. Dal-Tile Corporation.

2. American Olean Company.

B. Installation Materials: To establish quality for setting and waterproofing materials, Specification is based on ANSI A137.1. Products and methods of the following manufacturers may be provided:

1. Laticrete International, Inc.

2. Custom Building Products.

3. Mapei.

2.02 MATERIALS

A. Colors, Textures, and Patterns: Tile shall be from manufacturer's standard product line. 90% shall be from "price group 2", and "10% from price group 3", unless indicated otherwise. Tile trim and accessories shall match adjoining tile. Grout color shall match tile unless otherwise indicated.

B. Tile sizes: Tile sizes specified are modular dimensions unless otherwise indicated.

C. Mortar Sand: ASTM C 144.

D. Portland Cement: ASTM C 150, Type I or II.

E. Hydrated Lime: ASTM C 207, Type S; or ASTM C 206 Type S

F. Portland Cement Mortar: ANSI 118.1

G. Portland Cement Mortar Bed: Sand-cement mortar mix gauged with Laticrete Acrylic Admix or Custom Building Products Thin-Set Mortar Admix.

H. Portland Cement Mortar Bed for Shower Areas: Laticrete 226 Thick Bed Mortar Mix Gauged with Laticrete 3701 Mortar and Grout Admix or on site mix per ANSI A108.1A with Custom Building Products Thin-Set Mortar Admix.

I. Latex Portland Cement Bond Mortar: Laticrete 317 Floor & Wall Thinset gauged with Laticrete 3701 Admix, or Custom Building Products Master Blend mixed with Thin-Set Mortar Admix.

J. Waterproof Membrane: Cold-applied, single component liquid with embedded reinforcing fabric where recommended by manufacturer: Laticrete Hydro Ban Waterproof Membrane or Custom Building Products Red Guard Waterproof Membrane.

K. Reinforcing Wire Fabric: 2-inch x 2-inch, 16 x 16 gage, galvanized electrically welded wire reinforcing, per ASTM A 185.

L. Latex Portland Cement Grout: Laticrete Sanded Grout (1500 Series), Custom Polyblend Sanded Grout or Laticrete Unsanded Grout 1600 Series (for joints smaller than 1/8"), Custom Polyblend Unsanded Grout.

M. Epoxy Grout for Quarry Tile: Laticrete Spectralock Pro Epoxy Grout for Floors and Walls or Custom 100% Solids Epoxy Grout.

N. Cleavage Membrane and Wall Backing Paper: Cleavage membrane shall be 15-pound asphalt-saturated felt manufactured according to ASTM D226-97a Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

O. Separation Material (for all caulked joints including perimeters and quarry-tile fields of floor mortar beds): Quality Foam, QF 200 white, 3/8" wide x 5" high.

P. Backer Rod for sealants (for ceramic mosaic fields): Polyethylene foam, closed-cell, flexible and compressible, 3/16" diameter.

Q. Cleaner and Sealer:

1. Cleaner and sealer shall be from one manufacturer, acceptable to tile and grout manufacturers. To establish quality, the Specification is based on Aqua Mix Inc. Equivalent products from Miracle Sealants Co. or Watco Tile and Brick may be provided.

2. Cleaner: Aqua Mix Concentrated Tile Cleaner, neutral phosphate-free cleaner, or Custom Building Products Tile Lab Concentrated Tile/ Stone Cleaner.

3. Sealer: Aqua Mix Penetrating Sealer, fungus- and bacteria-resistant, stain-resistant, and slip-resistant as specified for tile, or Custom Building Products Tile Lab Surface Gard.

R. Sealant:

1. Sealant and primer shall be from one manufacturer, acceptable to tile and grout manufacturers. To establish quality, the Specification is based on the following products. Equivalent products from other approved manufacturers may be provided (see Section 07920, Joint Sealants).

2. Sealant for Ceramic Mosaic Tile: Pecora 898 Silicone Sanitary Sealant or Laticrete Latasil NS.

S. Sealant for Quarry Tile: Pecora Dynatrol II-S6, polyurethane, slope grade, traffic grade or Laticrete Latasil HD

2.03 TILE

A. Unglazed Ceramic Mosaic Floor Tile:

1. Size: 1 inch x 1 inch or as indicated.

2. Colors and patterns as selected by Architect from price groups specified.

3. Slip Resistance: Resistant to slipping appropriate to the installed conditions of use, as required by the California Building Code and ADA.

a. As a minimum, the coefficient of friction as measured by ASTM C 1028 shall be 0.6 except ramps shall be 0.8.

b. For tile in shower and locker areas, incorporate grit into tile to increase slip resistance.

B. Glazed Wall Tile:

1. Size: 4-1/4 inch x 4-1/4 inch face dimensions x 5/16 inch thick (ceramic mosaic tile may also be used on walls).

2. Colors and patterns as selected by Architect from price groups specified.

C. Unglazed Paver Tile:

1. Porcelain, flat tile.

2. Size: 12 inch x 12 inch, or as shown.

3. Colors and patterns as selected by Architect from price groups specified.

4. Slip Resistance: Resistant to slipping appropriate to the installed conditions of use, as required by the California Building Code and ADA. As a minimum, the coefficient of friction as measured by ASTM C 1028 shall be 0.6 except ramps shall be 0.8.

D. Trim:

1. Integral bullnose at external corners.

2. Provide bullnose where tile projects from jamb.

3. Mosaic tile base with wall tile above: A3401.

4. Mosaic tile base without wall tile above: S3619T (6-inch high sanitary coved base).

5. Bullnose at wainscot: A4200 and A4402.

E. Quarry Tile:

1. Size: 6 inch x 6 inch x 1/2 inch, square edge.

2. Slip Resistance: The coefficient of friction shall be 0.6 except for ramps, which shall be 0.8. when tested in "wet conditions"

3. Kitchen Floor Color: Blaze Flash (red).

4. Non-Kitchen Floor Colors: As selected by Architect from manufacturer's standard colors.

5. Base: Trim shape Q 3565, 6 inch x 5 inch x 1/2 inch cove base, round top with integral bull nose or cove forming corners, and related trim pieces.

F. Stone Thresholds:

1. Exterior installation: Marble thresholds with minimum abrasive hardness value of 10 tested in accordance with ASTM C241.

2. White honed marble complying with Marble Institute of America Group "A," unless other color indicated.

3. Size and profile shaped to provide transition between tile surfaces and adjoining finished floor surfaces, or as indicated. Width not less than 4." Edges beveled on a slope of no greater than 1:2. Cut to fit door frame profile.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Examine substrates and conditions for compliance with installation requirements. Verify that all penetrations through substrate have been installed. Proceed with Work only after all conditions are in compliance.

B. Substrates shall be firm; dry; clean and within flatness tolerances required by relevant ANSI A108 tile installation standards. Prepare surfaces as follows:

1. Concrete Floors: Allow concrete floors to cure for 28 days minimum before beginning tile and grout installation. Remove laitance, sand, dust, and loose particles.

2. Plywood Subfloors: Before installing mortar setting bed over plywood sub-floors, install cleavage membrane over sub-floor. Anchor firmly in place and lap joints 6 inches minimum. Turn membrane up 6" at walls and beneath building felt on walls.

C. Substrates to receive wall tile and base shall be:

1. Scratch coat of cement plaster, as specified in Section 09220: Portland Cement Plaster and Metal Lath (required in student restrooms, showers and locker rooms, and quarry tile bases).

2. Cementitious backing panels, as specified in Section 09250: Gypsum Board.

D. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical items of Work, and similar items located in or behind tile has been completed before installing tile.

E. Verify that joints and cracks in tile substrates are coordinated with caulked-joint locations; if not coordinated, adjust as required by the Architect.

F. Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are maintained in compliance with referenced standards and manufacturer's written instructions.

G. Protect adjacent surfaces during progress of Work of this section.

3.02 TILE INSTALLATION, GENERAL

A. Install tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Center the tile fields in both directions for each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

B. For tile mounted in sheets: Joints between tile sheets shall be the same width as joints within tile sheets.

C. Extend Work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. 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 damaging tile. Carefully grind the cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Locate joints, directly above joints in concrete substrates, at horizontal and vertical changes in plane, or where indicated during installation of mortar beds. In quarry tile floors, provide at 12 feet on center maximum. Provide 3/8-inch wide foam at joints. Do not saw-cut joints after installing tiles.

F. Prepare and clean joints to be caulked. Apply sealants to comply with requirements of Section 07920: "Joint Sealants.

G. Conform to manufacturers printed instructions, and applicable requirements of ANSI and TCA Standards.

3.03 TILE INSTALLATION, FLOOR

A. Install reinforcing and latex Portland-cement mortar setting bed over cured concrete slab or cleavage membrane on plywood floor. Lap reinforcing at least one full mesh, and support or lift so that it is approximately in the middle of mortar bed. Do not abut against vertical surfaces. Install foam separation material at perimeters and expansion joint locations for caulked joints.

B. Mix setting mortar in accordance with ANSI recommendations.

C. Once begun, mortar installation must continue until room is completed. Discard any batch not floated and finished within ½ hour of mixing. Firmly compact before screeding. Screed to true plane and pitch as indicated. Slope mortar bed sufficiently that water flows to drain and no puddling will occur. Slope mortar down to floor drains for proper installation of waterproof membrane. After screeding, firmly rub down with steel or wood float.

D. Cure mortar bed with a light fog spray of water and cover with 6-mil Visqueen for 72 hours.

E. Waterproof Membrane:

1. Install waterproof membrane where indicated and in all kitchen, toilet, shower, and locker areas according to TCA Standards. Extend membrane up wall mortar or backing board as follows:

   a. 3" above top of curb wall.

   b. 6" minimum above floor.

   c. In shower rooms, install from floor to ceiling.

2. Insure that all layers of membrane are fully inserted into clamping ring of floor drain. After membrane installation and before tile setting, install pea gravel around sub drain to prevent blockage of weep holes and place mortar to proper level for setting tile.

3. Before setting tile and after seven days curing, water test membrane by damming drains and doors, filling floor with water to 4-inch minimum depth, and leaving for 24 hours. Correct any leaks and re-test before proceeding. After testing, protect membrane from traffic until tile Work begins.

F Thin Set Method: Confirm substrate is completely clean and free of dust. Cut foam at floor perimeters flush with top of mortar bed. Insure that bond coats do not intrude into joints to be caulked. Install tile over properly cured setting bed or waterproof membrane utilizing "thin-set" method with latex portland cement bond mortar, in accordance with manufacturer's printed instructions and ANSI A108.5.

G. Minimum coverage of bond mortar shall be 80% except 95% in shower areas, for quarry tile, and exterior installations. Place tile into fresh mortar press tile to insure full contact. Before setting proceeds, set and remove three tiles or sheets of tiles to confirm specified coverage of bond mortar. If coverage is insufficient, utilize a larger toothed trowel or back butter tiles until proper coverage is provided.

H. Install tile on floors with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 to 1/8 inch.

2. Quarry Tile: 1/4 to 3/8 inch.

3. Paver Tile: 3/16 to 3/8 inch.

I. Install base tile for quarry tile floors on a mortar bed, with joints matching floor.

3.04 TILE INSTALLATION, WALLS

A. Install wall mortar beds before floor mortar beds.

B. On plaster walls, clean scratch coat surface of loose or foreign materials, fog spray with water, and install brown coat mortar bed over scratch coat to a thickness not less than 3/8" and not greater than 3/4 inch. Once started, wall mortar installation must continue until wall is completely floated. Discard any batch not floated and finished within ½ hour of mixing. As soon as wall mortar is dried to sufficient hardness, but still plastic, firmly rub with wood float.

C. Cover cure with 40 wt. Kraft paper for 72 hours minimum.

D. Install tile over properly cured setting bed, waterproof membrane, or cementitious backing panels utilizing "thin-set" method with latex portland cement bond mortar, in accordance with manufacturer's printed instructions and ANSI A108.5. Confirm substrate is completely clean and free of dust. Insure that bond coats do not intrude into joints to be caulked.

E. Minimum coverage of bond mortar shall be 80% except 95% in shower areas or exterior installations. Set and test as specified for floors.

F. Lay out Work so tiles will be centered on each wall or section of wall in order to minimize tile cuts. Lay out tile wainscots to next full tile beyond dimensions indicated. Spot setting bed with mortared tile, set plumb and true, accurately indicate plane of finished tile surfaces.

G. Install tile on walls with following joint widths:

1. Glazed Wall Tile: 1/16 inch.

2. Ceramic Mosaic Tile: 1/16 to 1/8 inch.

3. Quarry Tile: 1/4 to 3/8 inch..

4. Special Large Tile: 3/16 to 3/8 inch.

H. Horizontal joints shall be level, vertical joints plumb with surfaces true and plumb, edges of tiles flushed.

I. Rub exposed cuts smooth with a fine stone; no cut edge shall be set against a fixture or adjoining surface without a 1/16 inch joint to be caulked.

J. Install access doors where required, furnished under another section, in correct location, plumb or level, flush with adjacent construction, and securely fastened to framing.

3.05 GROUTING

A. Prior to starting, ensure that all tile surfaces are clean and excessive bond mortar is scraped and vacuumed from joints (approximately 2/3 depth of tile should be open

for grouting). Follow manufacturer's instructions for mixing grout. Once grout Work commences, proceed until complete wall or floor area is finished utilizing one batch of grout.

B. Latex portland cement grouting: Dampen tile surface and joints with water using sponge, but leaving no puddles in joints. Force grout into joints using sufficient pressure on rubber float so as to fill joints completely, and scrape excess grout off tile surface with rubber float. Smooth or tool grout to uniform joint finish. Do not over water.

C. Curing latex Portland cement grout: Remove final grout haze with clean soft cloth, and cover with 40-weight Kraft paper to cure. Leave paper in place for protection. Cover wall surfaces with 40-weight Kraft paper for 72 hours.

D. Epoxy grouting: Do not dampen tile. Follow manufacturer's instructions for mixing grout. Force grout into joints with sufficient pressure on rubber float so as to fill joints completely, and scrape excess grout off tile surface with rubber float. Smooth or tool grout to uniform joint finish. Do not allow grout to harden on face of tile.

E. Curing epoxy grout: Do not cover floor, but do not allow foot traffic for 72 hours. Then, if grout is not tacky, cover with 40-weight Kraft paper for protection.

3.06 CLEANING AND SEALING

A. If grout scum is not visible on tile surface after curing, clean tile surface with clear water. Remove and replace cracked, broken or defective Work with proper material.

B. If, when curing membrane is removed, grout scum is visible on tile surface, use the following cleaning method:

1. Immediately recover floor with paper or felt and allow to continue curing for a minimum of 14 days; uncover floor and maintain entire tile surface saturated with clean cool water for not less than 2 hours.

2. Utilize a neutral cleaner acceptable to manufacturers of tile and grout, and follow manufacturer's instruction. Do not provide generic acid cleaners.

3. Wet tile floors and apply cleaning solution to floor surface, then scrub with a brush. Rinse area several times with clean water to flush solution off floor surface.

C. Apply penetrating sealer in accordance with manufacturer's instructions utilizing a dense sponge applicator, paint pad, sprayer or brush. Avoid overlapping, puddling, and rundown. Completely wipe surface dry within 3 to 5 minutes using cotton or paper towels; do not allow sealer to dry on tile. After 2 hours, test surface by

applying water droplets to surface. If water is absorbed, apply a second coat. Avoid surface traffic for 24 hours.

3.06 CAULKING

A. Insure joints to be caulked are free of all setting and grouting materials and construction debris. Do not permit any foot traffic on installed caulking for a minimum of 48 hours or protect with hardboard strips.

B. Install in accordance with Section 07920: Joint Sealants.

3.07 PROTECTION

A. Admit no traffic where tile is installed until mortar and grout has set for a minimum of 72 hours.

B. Protect Work of this section until Substantial Completion.

3.08 CLEAN UP

A. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provisions of Division 01 apply to this section.

B. Work Included:

1. Lay-in acoustical ceiling systems and metal suspension system.

C. Related Sections:

1. Section 09 22 16: Metal Support Assemblies.

2. Section 09 29 00: Gypsum Board.

3. Division 23: Mechanical.

4. Division 26: Electrical.

1.02 QUALITY ASSURANCE

A. Ceiling systems shall consist of lay-in acoustical ceiling panels by a single manufacturer and suspension systems by a single manufacturer for the entire project.

B. Qualifications of Installer: Minimum 5 years experience in installing acoustical ceiling systems of the types specified.

C. Design Criteria:

1. Deflection of finished surface to 1/360 of span or less.

2. 1/8 inch maximum permissible variation from true plane measured from 10 foot straightedge placed on surface of finished acoustical fiber units.

3. Made from rapidly renewable BioAcoustic substrate (45% rapidly renewable content, post-consumer fibers with 23% recycled content) with rapidly renewable binders.

4. Panel materials shall meet the requirements of CHPS EQ2.2.6.

5. CHPS Low-Emitting Materials Table: Materials submitted must be listed as low emitting on the CHPS website, www.CHPS.net, or must be tested by an independent laboratory as prescribed by CHPs.

6. Materials shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

D. Requirements of Regulatory Agencies:

1. Conform to CBC requirements and UL - Tunnel Test for Fire Hazard Classification of Building Materials.

2. CISCA: Acoustical Ceilings Use & Practice.

E. American Society for Testing and Materials (ASTM):

1. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

4. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

5. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

7. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

8. ASTM E1414 - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

9. ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

F. American Society of Civil Engineers (ASCE):

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

1.03 SUBMITTALS

A. Samples:

1. Lay-in panels of each specified type, 6 inch x 6 inch minimum size.

2. Suspension System: 12 inch long samples of suspension system members, connections, moldings and wall angles, for each color specified.

B. Shop Drawings:

1. Indicate complete plan layouts and installation details.

2. Indicate related Work of other sections which is installed in, attached to, or penetrates ceiling areas, such as air distribution and electrical devices.

C. Product Data:

1. Suspension System for Lay-in Ceiling: Printed data for all suspension system components, including load tests, indicating conformance to specified tests and standards.

2. Acoustical units: Printed data indicating conformance to specified tests and standards.

D. Maintenance Materials: Provide extra panels equal to 1 percent of the area of each typical module size of acoustical panel, but not less than 8 of each specified size, style and color.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project site in original sealed packages.

B. Storage: Store materials in building area where they will be installed, in original package. Keep clean and free from damage due to water or deteriorating elements.

C. Handle in a manner to prevent damage during storage and installation.

1.05 PROJECT CONDITIONS

A. Installation of acoustical ceiling system shall not begin until the building is enclosed, permanent heating and cooling is in operation, and residual moisture

from plaster and concrete work has dissipated. Building areas to receive ceilings shall be free of construction dust and debris.

B. Environmental Requirements: Maintain temperature in space at 55 degrees F or above for 24 hours before, during, and after installation of materials.

C. Scheduling:

1. Before concealing Work of other sections, verify required tests and inspections have been completed.

2. Coordinate with related Work of other sections. Coordinate location and symmetrical placement of air distribution devices, electrical devices, and all penetrations with related Work section.

1.06 WARRANTY

A. Manufacturer shall provide a 10 year material warranty.

B. Installer shall provide a 2 year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. USG Corporation.

B. Armstrong World Industries.

C. CertainTeed Ceilings Corp.

2.02 SUSPENSION SYSTEM

A. Metal suspension system for acoustical lay-in tile shall be hot-dipped galvanized steel conforming to ASTM A653. Main beams and cross tees shall be double-web steel construction with exposed flange design, with factory punched cross tee slots, hanger holes and integral couplings.

B. Metal suspension system for acoustical lay-in tile shall conform with ASTM C635, and section 13.5.6 of ASCE 7, as modified in CBC section 1615A.1.16, for installation in high seismic areas.

C. Structural classification of suspension systems shall be heavy-duty in conformance to ASTM C635.

D. Vertical Strut: USG Donn Compression Post, or equal, or as indicated; types and designs complying with requirements of authorities having jurisdiction and seismic Zones D, E and F requirements. Provide base attachment clip for connection of vertical strut to main beams.

E. Wall Molding: Fabricated from galvanized steel with 2 inch horizontal leg and hemmed edges, same finish as main and cross tees.

F. Spacer/Stabilizer Bars: Provide for tying together the ends of main runners and cross tees that are not attached to wall molding.

G. Hanger Wire: No. 12 gage (9 gage for pendant fixtures), galvanized soft annealed mild steel wire as defined in ASTM A641, Class 1 coating.

H. Provide attachment devices and any other required accessories for a complete suspended ceiling system installation.

I. Total recycled content: 63%

2.03 ACOUSTICAL CEILING PANELS

A. Acoustical ceiling panels shall be class A in accordance to ASTM E1264.

B. Acoustical panels shall meet the following surface-burning characteristics when tested in accordance to ASTM E84 for Class A materials:

1. Maximum Flame Spread: 25.

2. Maximum Smoke Developed: 50.

C. Mold and Mildew Resistance: All panels and faces shall be treated with a biocide paint additive or an antimicrobial solution to inhibit mold and mildew.

2.04 CEILING TYPES

A. ACT 1 - Classrooms:

1. Acoustical Ceiling Panels:

a. Panel Name: Armstrong Tierra – BioAcoustic substrate or equal.

b. Panel Size: 2 foot x 4 foot.

c. Panel Thickness: 3/4 in.

d. Edge Detail: Lay-in.

e. Light Reflectance: 0.82 minimum, complying with ASTM E1477.

f. CAC: Minimum 35 - 39, UL Classified, complying with ASTM E1414.

g. NRC: Minimum 0.85, UL Classified, complying with ASTM C423.

h. Color: White.

i. Recycled Content: Minimum 23 percent.

j. Anti-Microbial: BioBlock Plus

k. Sag Resistance: HumiGuard Plus

2. Suspension System:

a. Suspension System Name: Prelude XL HRC (high recycled content) by Armstrong or equal

b. Color: White.

PART 3 - EXECUTION

3.01 PREPARATION

A. Furnish layouts for inserts, clips or other supports and struts required to be installed by the Work of other trades that depend on the suspended ceiling system for support.

B. Coordinate related Work to ensure completion prior to installation of clips or fasteners.

C. Compare layouts with construction conditions. Tile shall be spaced symmetrically about the centerlines of the room or space, and shall start with a tile or joint line as required to avoid narrow tiles at the finish edges unless indicated otherwise. Joints shall be tight with joint lines straight and aligned with the walls. Ceiling moldings shall be provided where tile abuts wall with matching caulking to eliminate any space.

3.02 INSTALLATION OF SUSPENSION SYSTEMS

A. General:

1. Install suspension system in accordance with ASTM C636.

2. System shall be complete; with all joints neatly and tightly joined and securely fastened; suspension members shall be installed in a true, flat, level plane.

3. Hanger Wires: 12 gage minimum; larger sizes as indicated or required.

   a. Fasten wires to panel points and structure above per most stringent requirements of fabricator and CBC and as indicated on Drawings.

   b. Wires exceeding 1:6 out-of-plumb shall be braced with counter-sloping wires.

   c. Maintain wires 8 inches minimum clear of non-braced ducts, pipes, and other items.

   d. Install wire along main runners at 4 feet on center. Terminal ends of each main runner and cross tee must be supported within 8 inches of each wall with a perimeter wire.

   e. Where obstructions prevent direct suspension, provide trapezes or equivalent devices; 1-1/2 inches minimum cold-rolled channels back to back may be installed for spans to 6 feet max.

   f. Wire shall be straight, without extraneous kinks or bend. Hanger wire connections must be capable of carrying a 200 - pound pull without stretching or shifting the suspension clip.

4. Bracing Wires to Resist Seismic Forces: 12 gage minimum, larger sizes as indicated or required.

   a. System for Bracing Ceilings: Lay-In Ceiling Systems: Install one four-wire set of sway-bracing wires and a vertical strut for each 144 square feet maximum of ceiling area. Locate wire-sets and struts at 12 feet maximum on center. At ceiling perimeters, wire-sets shall be installed within 6 feet of walls.

   b. Install four-wire sets and struts within 2 inches of cross-runner intersection with main runner; space wires 90 degrees from each other.

c. Do not install sway bracing wires at an angle greater than 45 degrees with the ceiling plane.

d. Wires shall be tight, without causing ceiling to lift.

e. Fasten struts in accordance with CBC requirements.

5. Provide all additional wires, 12 gage minimum, necessary to properly support suspension at electrical devices, air distribution devices, vertical soffits, and other concentrated loads.

6. Suspension:

a. Suspension members shall be fastened to 2 adjacent walls; but shall be 3/4 inches minimum clear of other walls.

b. Any suspension members not fastened to walls shall be interconnected to prevent spreading, near their free end, with a horizontal metal strut or 7445 stabilizer bar or 16 gage taut tie wire.

c. Provide additional tees or sub-tees to frame openings for lights, air distribution devices, electrical devices, and other items penetrating through ceiling, which do not have an integral flange to support and conceal cut edges of acoustic panels. Provide cross-bracing necessary to securely support any surface mounted fixtures or other items.

7. Attachment of Wires:

a. To Metal Deck or Steel Framing Members: Install as required by current code.

b. To Suspension Members: Insert through holes in members or supporting clips.

c. All wires shall be fastened with three tight turns minimum for hanger wires and four tight turns minimum bracing wires. All turns shall be made in a 1-1/2 inches maximum distance.

B. Suspension System for 2 Foot x 4 Foot Lay-in Acoustical Ceilings:

1. Main Runners: Install main runners 48 inches apart; 12 gage hanger wires space 48 inches on center maximum along runners, and within 8 inches of ends.

2. Install wall moldings with fasteners to studs. Install corner caps at molding intersections.

3. Cross-Tees: Install between main runners in a repetitive pattern of 2 foot spacings.

4. Sub-Tees: Install at edges of penetrations.

3.03 INSTALLATION OF ACOUSTICAL PANELS

A. Install panels into suspension system. Partial panels shall be neatly cut and fitted to suspension and around penetrations and/or obstructions. Duplicate tegular edges at partial panels; cuts to be straight. Repaint cut tiles to match color or as directed by manufacturer for mylar facing at visually exposed conditions or as required by the Architect.

3.04 AIR DISTRIBUTION DEVICES

A. Refer to and coordinate with Division 23: Mechanical.

B. Install air distribution grilles and other devices into suspension system. Install 4 taut wires, each 12 gage minimum, to each device within 3 inches of device corners, to support their weight independent of the suspension system.

3.05 LIGHT FIXTURES

A. Refer to and coordinate with Division 26: Electrical.

B. Fixtures weighing less than 56 pounds: Install fixtures into suspension systems and fasten earthquake clips to suspension members. Install minimum 2 slack safety wires, each 12 gage minimum, to each fixture at diagonally opposite corners, to support their weight independent of the system.

C. Fixtures weighing 56 Pounds or more: Install fixtures into suspension system and fasten earthquake clips to suspension system members as required by the Drawings and/or code. Install not less than 4 taut 12 gage wires capable of supporting four times the fixture load.

3.06 CLEANING

A. General: After installation of acoustical material has been completed, clean all surfaces of the material, removing any dirt or discolorations. Replace panels as required.

B. Acoustical Panels: Minor abraded spots and cut edges shall be touched up with the same paint as was used for factory applied finish of the lay-in panels.

C. Remove and replace work that can not be succesfully cleaned and repaired to eliminate evidence of damage.

3.07 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose off of the Project site.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Topset coved rubber base for installation with surface flooring.

C. Related Sections:

1. Section 09 65 19: Resilient Tile Flooring.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's published technical data describing materials, construction and recommended installation instructions. Submit technical data and installation instructions for each adhesive material.

B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care and cleaning of base.

C. Samples: Submit Samples of top set base in each available color. Following color selections, submit Samples, not less than 12 inches long of each selected color and type. Submit pint cans of each type adhesive.

D. Maintenance Materials: Before Substantial Completion, deliver at least 50 lineal feet and 5 outside corner units of each color of rubber base installed. Deliver the materials in unopened factory containers or in sealed cartons with labels identifying the contents, matching installed materials. Include unopened cans of adhesives adequate to install the maintenance materials.

E. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants and CHPS EQ2.2.3 for materials.

1.03 QUALITY ASSURANCE

A. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar flooring materials.

B. Comply with the following as a minimum requirement:

1. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM F 1861: Standard Specification for Resilient Wall Base.

3. All chemically based products such as sealers, primers, fillers, adhesives, etc. must be approved by Owner's Office of Environmental Health and Safety (OEHS).

4. Each selected color and configuration shall be from same dye lot and color.

5. Materials shall meet the requirements of CHPS EQ2.2.3.

6. CHPS Low-Emitting Materials Table: Materials submitted for rubber base assemblies must be listed as low emitting on the CHPS website, www.CHPS.net, or must be tested by an independent laboratory as prescribed by CHPs.

7. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

   A. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

   B. Adhesives and sealants shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.04 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name. Store materials at room temperature, but not less than 70 degrees F, for a minimum of 48 hours before installation, unless otherwise indicated in manufacturer's printed instructions..

1.05 PROJECT CONDITIONS

A. Ventilation and Temperature: Verify areas that are to receive rubber base are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufactures for site installation conditions.

1.06 WARRANTY

A. Manufacturer shall provide a 5 year material warranty.

B. Installer shall provide a 2 year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Burke/Mercer Wall Base.

B. Roppe, Pinnacle Rubber Base.

C. Flexco Company, Wallflower Premium Rubber Wall Base.

2.02 MATERIALS

A. Rubber base: Conform to ASTM F 1861; Group 2, solid (homogeneous); Type 1, TS, (thermoset) vulcanized rubber, Style A, 4 inch high unless otherwise indicated, integral colors as selected, non-shrinking, 1/8 inch thick, with matching molded outside corners.

B. Base Adhesive: Water based, low odor type, as recommended by manufacturer of rubber base.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate the Work of this section with other sections to provide a level, smooth and clean finish surfaces to receive rubber base.

3.02 EXAMINATION

A. Field verify dimensions and other conditions affecting the Work of this section before commencing the Work of this section.

B. Before Work is started, examine surfaces that are to receive rubber base. Deficiencies shall be corrected before starting the Work of this section.

3.03 PREPARATION

A. Do not start preparation until adjacent concrete floor slabs are at least 90 days old and finish flooring is installed.

B. Install rubber base when ambient temperature is 70 degrees F. or higher.

3.04 INSTALLATION

A. Install top set base at all hard floors, including resilient flooring, concrete and wood, carpet and other soft floors, unless otherwise indicated on drawings.

B. Securely fasten cement base to backing in long lengths in accordance with manufacturer's recommendations. Lay out lengths so that not less than 18 inches long filler pieces are provided. Assure that top and toe continuously contact the wall and floor, and that all joints are tight. Install matching factory formed external corners at all offsets. All inside corners shall be coped; wrapped corners are not acceptable.

C. Use of adhesive gun is prohibited. Apply adhesive directly to substrate using the appropriate notched trowel or spreader according to manufacturer's instructions. Maintain 1/8 inch gap from top of base to prevent adhesive oozing onto adjacent surfaces.

D. Base and outside corners shall be rolled with a seam roller before adhesive sets.

3.05 CLEANING

A. Maintain surfaces of base clean as installation progresses. Clean rubber base when sufficiently seated and remove foreign substances.

B. Clean adjacent surfaces of adhesive or other defacement. Replace damaged and/or defective Work to the specified condition.

3.06 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Vinyl composition tile flooring as indicated.

C. Related Sections:

1. Section 03 30 00: Cast-in-Place Concrete.

2. Section 09 29 00: Gypsum Board

3. Section 09 65 13: Resilient Base and Accessories.

4. Section 14 21 00: Hydraulic Elevators.

1.02 DEFINITIONS

A. Pop-up: A pop-up is defined as any surface deviation or looseness of substrate that is equal to or greater than 1/64 (0.015625) inch above the concrete floor level, regardless of the size.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's published technical data describing materials, construction and recommended installation instructions. Submit technical data and installation instructions for each adhesive material. Submit test data showing adhesive minimizes plasticizer migration. Submit list and Product Data of recommended finish materials. Submit data verifying slip-resistance.

B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care, and cleaning of vinyl composition tile.

C. Samples: Submit Samples of vinyl composition tile and any reducers or transitions in each available color and pattern. Following color selections, submit full size samples of each selected color and pattern. Submit pint cans of each type of adhesive.

D. Maintenance Materials: Before Substantial Completion, deliver one unopened container of each color and pattern of vinyl composition tile in each color and

pattern installed. Label each container indicating locations installed. Include unopened cans of adhesives adequate to install the maintenance materials.

E. Installer's Experience Qualifications: Submit list of not less than 5 projects, extending over period of not less than 5 years, indicating installer's experience record. Submit letter from manufacturer indicating manufacturer's approval for installer of the products.

F. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants and CHPS EQ2.2.3 for materials.

1.04 QUALITY ASSURANCE

A. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar flooring materials.

B. Qualifications of Supervising Installer: In addition to the qualifications of the installer listed above, the flooring installer's supervisor shall have a minimum of 10 hours Cal-OSHA safety training.

C. Pre-Installation and Progress meetings: Prior to start of work of this section and after approval of submittals, schedule on-site meetings between Contractor, Supervising Installer, OAR and IOR to review installation and procedures required for project.

D. Comply with the following as a minimum requirement:

1. All materials shall be ADA compliant with a coefficient of friction of at least 0.6 per ASTM D2047 per CBC 1124B.1/ADA Standards 4.5.1.

2. ASTM E 84: Class A Flame Spread Rating of 25 or less.

3. NSF/ANSI 332: for resilient flooring. Products must be certified under applicable Environmentally Preferable Products (EEP) certification programs to meet HPI-CHPs point ME5.1.

4. Materials shall meet the requirements of CHPS EQ2.2.3.

5. CHPS Low-Emitting Materials Table: Materials submitted for rubber base assemblies must be listed as low emitting on the CHPS website, www.CHPS.net, or must be tested by an independent laboratory as prescribed by CHPs.

6. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

A. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

B. Adhesives and sealants shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.05 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name.

B. Materials shall be stored at room temperature, but not less than 70 degrees F for not less than 48 hours before installation, unless manufacturer's instructions specify otherwise.

1.06 PROJECT CONDITIONS

A. Ventilation and Temperature: Verify areas that are to receive new flooring are ventilated to remove fumes from installation materials. Verify that areas are within temperature range recommended by the various material manufactures for Project site installation conditions.

1.07 WARRANTY

A. Manufacturer shall provide a 5 year material warranty.

B. Installer shall provide a 2 year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Armstrong World Industries.

B. Mannington Commercial.

C. Congoleum, standard grade as manufactured by Mohawk.

D. Or equal.

2.02 MATERIALS

A. BioBased Tile: Conform to ASTM F 1066, Composition 1, asbestos free, Class 2 (through pattern), 12 inch by 12 inch by minimum 1/8 inch thick, as colors and patterns as indicated on Drawings.

1. Tile shall be from same batch and run number for each color.

2. Composed of polyester resin binder, fillers and pigments with colors and texture dispersed uniformly throughtout its thickness.

3. Basis of Design Product: Migrations by Armstrong World Industries

B. Crack Filler and Leveling Compound: 100% cementitious binder type (as defined by ASTM C150), shall be approved by Owner's Office of Environmental Health and Safety (OEHS). The following manufacturers are currently listed approved by OEHS:

1. Webcrete # 95 as manufactured by Durabond.

2. Ardex SD-F.

3. Armstrong S183 or S184..

4. Or as recommended by flooring manufacturer and approved by OEHS.

5. Leveling Compound shall meet or exceed 200 pounds when tested in accordance with ASTM C 1583.

C. Concrete Primer: Non-staining type recommended by manufacturer of vinyl composition tile. Concrete primer shall be OEHS approved.

D. Adhesive: Water based, low odor type formulated specially for installation with BioBased tile, and recommended by manufacturer.

E. Reducer Strips: Tapered rubber not less than one inch wide, and thickness to match tile.

F. Moisture Detection Equipment: Calcium chloride testing system, consisting of pre-packaged anhydrous calcium chloride crystal test kits, and an electronic gram weight scale measurable in 1/10 grams. Equipment shall be manufactured by one of the following:

1. Sealflex Industries, Inc., 3303 Harbor Blvd., Unit C2, Costa Mesa, CA 92626.

2. Vaprecision Inc, 3211 W. MacArthur Blvd, Santa Ana, CA 92704.

H. Floor Finish: One of the following systems:

1. Neutral cleaner, ACT sealer and Super Polymer 85 finish, manufactured by Maintex..

2. Sundance cleaner and Butcher's Mainstay floor finish, manufactured by Waxie Stationary Supply.

3. S-485 neutral cleaner, S-495 Floor Sealer and S-480 floor finish by Armstrong.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate with related Work to assure level, dry, smooth, and clean finish surfaces to receive vinyl composition floor tile.

3.02 EXAMINATION

A. Field verify and correct deficiencies of all conditions affecting Work before commencing Work of this section.

3.03 PREPARATION OF CONCRETE SLABS

A. Do not start preparation until underlying concrete floor slabs are at least 90 days old. Any leveling compound under a vapor or moisture barrier shall be warranted to be installed in a wet or moist environment without moisture limitations.

B. Leveling: Check sub-floors for true to level and plane within the tolerance listed in Manufacturer's installation instructions. Test floor areas both ways with a 10-foot straightedge and repair high and low areas exceeding allowable tolerance. Pop ups shall be hammered out and floor filled with an approved cementitious leveling compound. Remove high areas by power sanding, stone rubbing or grinding, chipping off and filling with an approved leveling compound, or equivalent method. Fill low areas with an approved leveling compound. Repair and level surfaces having abrupt changes in plane, such as trowel marks or ridges, whether or not within allowable tolerance. Clean areas where repairs are performed.

C. Cracks or Depressions: Fill voids with an approved cementitious leveling compound of the type recommended by flooring manufacturer for the specific Work conditions.

D. Cleaning: After leveling, clean substrates of all deleterious substances and foreign matter.

E. Moisture Testing: Test new and old concrete slabs for adequate dryness.

1. Testing shall conform to ASTM F 1869, and the following. Minimum testing requirements are 3 calcium chloride tests for the first 1,000 square feet of floor area, and one for each additional 1,000 square feet or fraction thereof. Unless more stringent requirements are recommended by flooring manufacturer, maximum allowable moisture release at time of flooring installation shall be 3 pounds per 24 hours per 1,000 square feet, or as recommended by flooring manufacturer. Provide results of moisture test to the OAR.

2. See 03 30 00 for ASTM F2170 testing. Relative humidity shall not exceed 80%

2. Test concrete for alkalinity. An acceptable range is between pH5 to pH9. Excessive alkalinity shall be neutralized, using manufacturer's recommended methods, prior to installation of floor covering.

3. Delay application of flooring until sub-floors are sufficiently dry according to flooring manufacturer's recommendations, or perform remedial measures as recommended by flooring materials manufacturer.

3.05 INSTALLATION OF TILE

A. Color and pattern: Install tiles in the pattern indicated on Drawings. If no pattern is indicated, tiles shall be installed in a rectangular pattern, in one color.

B. Special designs/school logo:

1. Fabricate of sizes and colors indicated on drawings and from electronic file provided by Architect.

2. Precision cut VCT tiles using either computer aided water-jet or laser technologies to a tolerance of 0.005 inch.

C. Install BioBased floor tile when ambient temperature is 70 degrees F or higher or manufacturer's range.

D. Install the tile adhesive in a thin film evenly with a notched trowel. Trowel notches shall be as recommended by adhesive manufacturer.

1. Mix adhesive in accordance with manufacturer's instructions. Provide all safety precaution during mixing.

2. Install adhesive only in area that can be covered by flooring material within the adhesive manufacture's recommended working time. Do not set tile into wet adhesive.

3. Tile must be set into dry, but still tacky, adhesive film. Remove adhesive that has dried beyond recommended time, or has filmed over and is no longer tacky.

4. Adhesive application rate shall be as required to avoid telegraphing trowel lines to the surface after maintenance coatings are applied. Adjust tile runoff during installation if necessary.

5. Immediately remove any excess adhesive from the tile surface using the adhesive manufacturer's recommended cleaner and a damp, not wet, cloth.

E. Provide reducer where floor covering edges are exposed, such as at center of the door or where floor coverings terminate.

F. Install tiles symmetrically about centerlines of areas progressing toward walls. Adjust border tiles as required. Tiles shall be straight and joints close. Tile shall be cut to fit snugly at doorframes, and walls. No slivers at edges.

G. Mechanically cut flooring material to produce square true edges.

H. As floor tile is installed and within adhesive's recommended working time, roll with a clean, smooth, 100-pound roller in both directions. As the rolling proceeds, replace any loosened, defective, or damaged tile with new and finish to the specified condition.

I. Remove all dust, debris, and soil with any combination of sweeping, micro-fiber dust-mopping with a properly treated, non-oily mop and vacuuming.

3.06 CLEANING, WAXING, AND COMPLETION

A. Maintain all flooring surfaces clean as installation progresses.

B. Use a sprayer to mist the area to be cleaned with a neutral cleaning solution prepared in accordance with manufacturer's instructions.

C. Gently scrub the floor using red or maroon cleaning, not stripping pads, mounted on a single disc, 175 RPM floor machine; or preferably, with a machine that uses horizontally mounted brushes with a counter-rotating spindle motion. Never allow the machine to remain running stationary.

D. Remove the resulting slurry with a wet vacuum.

E. Rinse the floor at least four times, each time using a clean mop and clean rinse water. On the first rinse, apply just enough water to keep the floor wet until the solution is picked-up with a vacuum. The next two rinses should be with a fairly well wrung-out, damp mop. The final rinse should produce virtually clean rinse water. Ensure the rinse water is clean throughout the rinsing process. Avoid tracking the floor after the final rinse. Check the floor after the final rinse for any missed areas and re-scrub/rinse as needed. Repeat the rinsing process until all signs of the cleaning solution are removed and the floor shows no sign of haziness or dusting when dry. If the Contractor has lightweight "automatic" floor machines capable of achieving the same result as described above, they may be used in-place of this method. Do not flood or excessively dampen floor at any time.

F. Allow the Work to dry thoroughly.

G. Finish BioBased tile with 2 coats of sealer, and 4 coats of finish (wax) applied in accordance with manufacturer's instruction. Each coat shall dry for a period of time recommended by the manufacturer. The last coat of floor wax shall be burnished in accordance with manufacturer's written instructions. Take care not to allow any foreign material, including dust and mop fibers to become embedded in any coat of wet sealer or finish.

H. After the last coat of floor finish has dried sufficiently according to the manufacturer's instructions, burnish work, using high speed equipment, in accordance with manufacturer's written instructions to bring the entire surface,

including the corners and edges, to high level of luster, free of all types of marks and dust embedded in finish

I. Clean adjacent baseboard and other surfaces of adhesive and other materials. Replace damaged or defective Work to the specified condition.

3.07 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 72 16

TACKABLE WALL SURFACING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:

1. Tackable Wall Surfacing

B. Related Sections/Items:

1. Division 01:
2. Primer/sealer application on gypsum board substrate, refer to Section 09 90 00.
3. Markerboards and tackboards, refer to Division 10.

1.2 SUBMITTALS

A. Comply with provisions as outlined in Division 01 and Section 01 33 00.

B. Product data indicating compliance with specified requirements.

C. Installation instructions.

D. Samples:

1. (3) 6"x 9" (150mm x 225mm) samples of each type of Wall Surfacing material required.

E. Product Data verifying compliance with CHPS EQ2.2.1 for adhesives and sealants and CHPS EQ2.2.6 for wall surfacing materials.

1.3 QUALITY ASSURANCE

A. Fire Performance Characteristics: Comply with fire performance characteristics indicated below. Identify components with markings from testing and inspection organization.

1. ASTM E-84 (Fuel Contribution) – Class B
2. NFPA 225 (Critical Radiant Flux) – Class II

B. Single Source Responsibility: Obtain tackable wall covering system components from a single source.

C. Deliver materials in original factory wrappings and containers, clearly labeled with manufacturer, brand name, and fire hazard classification.

D. Store materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within the storage area at not less than 70°F (21°C) during the period materials are stored.

E. Mock-ups: Prepare mock-ups for Architect's review and to establish requirements for seaming and finish trim.

1. Correct areas, modify method of application/installation, or adjust finish texture as directed by Architect to comply with specified requirements.
2. Maintain mock-ups accessible to serve as a standard of quality for this Section.
3. Install sample panel of each type wall covering specified.
4. Install panels in areas designated by Architect.

F. Adhesives and sealants shall meet the requirements of CHPS EQ2.2.1:

1. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Adhesive and Sealant Applications (amended July 2007, or current version).

2. Adhesives shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

F. Wall surfacing materials shall meet the requirements of CHPS EQ2.2.6:

1. CHPS Low-Emitting Materials Table: Materials submitted must be listed as low emitting on the CHPS website, www.CHPS.net, or must be tested by an independent laboratory as prescribed by CHPs.

2. Materials shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.4 PROJECT CONDITIONS

A. Maintain ambient temperature within building at not less than 68°F (20°C) for a minimum of 72 hours prior to beginning installation.

1. Do not install Bulletin Board until the space is enclosed and weatherproof. The temperature of the building should not be less than 68°F (20°C) for a minimum of 72 hours prior to installation.
2. Do not install Bulletin Board until the temperature is stabilized and the permanent lighting is in place.

1.5 MAINTENANCE

A. Maintenance instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

B. Extra materials: Deliver to Owner extra materials from same production run as installed products. Package with protective materials.

1. Provide 5% of amount installed.

1.6 WARRANTY

A. Manufacturer's standard 5-year limited warranty.

PART 2 – PRODUCTS

2.1 PRODUCTS

A. Manufacturer: Forbo Linoleum, Inc., Humboldt Industrial Park, P.O. Box 667, Hazleton, PA 18201 or approved equal. Phone: 800-842-7839. Phone: 570-459-0771. Fax: 570-450-0258. Email: info@fL-NA.com. Website: www.forboflooringNA.com.

B. Forbo Bulletin Board: Uni-color linoleum resilient homogeneous tackable surface consisting of linseed oil, granulated cork, rosin binders and dry pigments calendared onto a natural burlap backing. Color shall extend through thickness of material.

1. Bulletin Board Linoleum resilient tackable surface material: Width 48 inches and as required by the Drawings. Gauge: ¼-inch. 90-linear feet rolls (approximately). Minimum corner bend 2-3/4-inches. Dimensionally stable due to burlap backing.

2. All products shall be SMART Platinum certified.

3. Color: TBD

2.2 ACCESSORIES

A. Adhesive: Solvent free, SBR type linoleum adhesive; or polyvinyl acetate dispersion type (contact cement) when used in press.

B. Forbo L910 adhesive.

C. Aluminum trim as shown on the Drawings and Details.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions in which Bulletin Board will be installed.

1. Complete finishing operations, including painting, before beginning installation of Bulletin Board materials.
2. Wall surfaces to receive tackable wall surfacing material shall be dry and free from dirt, grease, loose paint and scale.
3. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface preparation: Remove hardware, accessories, plates and similar items to allow tackable wall surfacing to be installed.

1. Plaster surface: Remove surface chalk. In new work use moisture meter to determine moisture content. Do not begin installation when moisture content is greater than five percent.
2. Gypsum board surface: Recess nails and screws. Repair irregular tape joints, sand and remove dust.
3. Painted surfaces: Remove loose paint or scale. Sand surface of enamel or gloss paint and rinse with clear water.
4. Ensure gypsum wallboard surfaces scheduled to receive Bulletin Board are properly primed under
   Section 09 90 00.

B. Prime substrate as recommended by manufacturer.

3.3 APPLICATION

A. Comply with manufacturers printed installation instructions.
B. Apply adhesive with 1/16-inch square notch trowel to area to receive sheet.
C. Work from top to bottom then side to side. Roll sheet firmly into adhesive for positive contact and to remove air bubbles.
D. Remove adhesive residue immediately.
E. Scribe, cut and fit material to butt tightly to adjacent surfaces, built-in casework and permanent fixtures and pipes.
F. Lap and double cut seams.
G. Joints: Butt joint: Butted.
H. Trim: Aluminum edge trim framing all edges.

3.4 CLEANING

A. Clean wall covering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.

B. Remove excess adhesive using methods and materials recommended by manufacturer.

3.5 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

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SECTION 09 91 00

PAINTING AND COATING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Interior and exterior painting.

C. Following items shall not be painted:

1. Brass valves, chromium or nickel-plated piping and fittings.

2. Boiler control panels and control systems.

3. Fabric connections to fans.

4. Flexible conduit connections to equipment, miscellaneous name plates, stamping, and instruction labels and manufacturer's data.

5. Mechanical and electrical utility lines, piping and heating and ventilation ductwork in tunnels, under-floor excavated areas or crawl spaces, attic spaces and enclosed utility spaces.

6. Flag, floodlight, parking light poles and loudspeaker poles, metal stairs, handrails and chain-link fence with a galvanized finish, unless otherwise noted.

7. Structural and miscellaneous steel, open web steel joists and metal floor decking, which will not be exposed in final construction, shall have no finish other than one coat of shop primer.

8. Hardboard covering on tops and backs of counters and benches.

9. Brass, bronze, aluminum, lead, stainless steel and chrome or nickel-plated surfaces.

10. Non-metallic walking surfaces unless specifically shown or specified to be painted.

1.02 SYSTEM DESCRIPTION

A. Regulatory Requirements:

1. Paint materials shall comply with the Food and Drug Administration's (F.D.A.) Lead Law and the current rules and regulations of local, state and federal agencies governing the use of paint materials.

1.03 SUBMITTALS

A. List of Materials: Before submittal of samples, submit a complete list of proposed paint materials, identifying each material by distributor's name, manufacturer's name, product name and number, including primers, thinners, and coloring agents, together with manufacturers' catalog data fully describing each material as to contents, recommended installation, and preparation methods. Identify surfaces to receive various paint materials.

B. Material Samples: Submit manufacturer's standard colors samples for each type of paint specified. Once colors have been selected, submit Samples of each color selected for each type of paint accordingly:

1. Samples of Paint and Enamel must be submitted on standard 8 ½" x 11" Leneta Opacity-Display Charts. Each display chart shall have the color in full coverage. The sample shall be prepared from the material to be installed on the Work. Identify the school on which the paint is to be installed, the batch number, the color number, the type of material, and the name of the manufacturer.

2. Elastomeric shall be submitted in duplicate samples of the texture coating. Samples will be not less than 2 ½" by 3 ½" in size and installed upon backing. Finished Work will match the reviewed Sample in texture.

3. All materials and color samples shall be reviewed before starting any painting.

C. For transparent and stained finishes, prepare samples on same species and quality of wood to be installed in the Work, with written description of system used.

D. Product Data verifying compliance with CHPS EQ2.2.2.

1.04 QUALITY ASSURANCE

A. Certification of Materials: With every delivery of paint materials, the manufacturer shall provide written certification the materials comply with the requirements of this section.

B. Coats: The number of coats specified is the minimum number. If full coverage is not obtained with the specified number of coats, install additional coats as required to provide the required finish.

C. Install coats and undercoats for all types of finishes in strict accordance with the recommendations of the paint manufacturer as reviewed by the Architect.

D. Paint materials shall comply with the following as a minimum requirement:

1. Materials shall be delivered to Project site in original unbroken containers bearing manufacturer's name, brand number and batch number.

2. Open and mix ingredients on premises in presence of the IOR.

E. Paint materials shall meet the requirements of CHPS EQ2.2.2:

1. Meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings (amended July 2007, or current version).

2. All products shall comply with the requirements of the Safe Drinking Water and Toxic Enforcement Act of 1986 and the most current list of chemicals (Proposition 65, CA OEHHA). Products that are labeled or would require labeling under this law are not eligible for this credit.

3. Paints and coatings shall be tested and meet VOC emission requirements of the California Department of Public Health's (CDPH) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Chambers (2004), including its 2004 Addenda.

1.05 DELIVERY, STORAGE AND HANDLING

A. Storage and Mixing of Materials: Store materials and mix only in spaces suitable for such purposes. Maintain spaces clean and provide necessary precautions to prevent fire. Store paint containers so the manufacturer's labels are clearly displayed.

1.06 SITE CONDITIONS

A. Temperature: Do not install exterior paint in damp, rainy weather or until surface has thoroughly dried from effects of such weather. Do not install paint, interior, or exterior, when temperature is below 50 degrees F, or above 90 degrees F, or dust conditions are unfavorable for installation.

1.07 WARRANTY

A. Manufacturer shall provide a 3 year material warranty.

B. Installer shall provide a 3 year labor warranty.

1.08 MAINTENANCE

A. Provide at least one gallon of each type, color and sheen of paint coating installed. Label containers with color designation indicated on Drawings.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

A. Furnish the products of only one paint manufacturer unless otherwise specified or required. Primers, intermediate and finish coats of each painting system must all be the products of the same manufacturer, including thinners and coloring agents, except for materials furnished with shop prime coat by other trades.

B. Factory mix paint materials to correct color, gloss, and consistency for installation to the maximum extent feasible.

C. All paint materials to be minimum "Architectural Grade".

D. Gloss degree standards shall be as follows:

HIGH GLOSS	70 and above	EGGSHELL	30 to 47
SEMI-GLOSS	48 to 69	SATIN	15 to 29

2.02 MANUFACTURERS

A. Acceptable manufacturers, unless otherwise noted:

1. Dunn-Edwards Corporation Paints
2. Frazee Paints & Wall coverings
3. Vista Paints
4. Sherwin Williams
5. ICI Paints

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine surfaces to receive paint finish. Surfaces which are not properly prepared and cleaned or which are not in condition to receive the finish specified shall be corrected before prime coat is installed.

B. New woodwork shall be thoroughly cleaned, hand sandpapered, and dusted off. Nail holes, cracks or defects in Work shall be filled. On stained woodwork, fill shall be colored to match stain. Filling shall be performed after the first coat of paint, shellac or varnish has been installed.

C. Plaster surfaces except veneer plaster shall be allowed to dry at least 3 weeks before painting. Veneer plaster shall be allowed to dry sufficiently to receive paint as determined by moisture meter tests.

D. Metal surfaces to be painted shall be thoroughly cleaned of rust, corrosion, oil, foreign materials, blisters, and loose paint.

E. Do not install painting materials to wet, damp, dusty, dirty, finger marked, rough, unfinished or defective surfaces.

F. Concrete surfaces shall be dry, cleaned of dirt and foreign materials and in proper condition to receive paint. Neutralize spots demonstrating effects of alkali.

G. Mask off areas where necessary.

3.02 APPLICATION

A. Backpainting: Immediately upon delivery to the Project site, finish lumber and millwork shall be backpainted on surfaces that will be concealed after installation. Items to be painted shall be backpainted with priming coat specified under "Priming".

B. Priming: New wood and metal surfaces specified to receive paint finish shall be primed. Surfaces of miscellaneous metal and steel not embedded in concrete, and surfaces of unprimed plain sheet metal Work shall be primed immediately upon delivery to the Project site. Galvanized metal Work and interior and exterior woodwork shall be primed immediately after installation. Priming of surfaces and priming coat shall be as follows:

1. Knots, Pitch and Sap Pockets: Shellac before priming.

2. Exterior Woodwork and Wood Doors: Prime with one coat of exterior waterborne emulsion wood primer.

3. Interior Woodwork: Where indicated to be painted, prime with one coat of waterborne wood primer.

4. Stain: Woodwork indicated to receive a stain and varnish finish shall be stained to an even color with water borne stain. On open-grained hardwood, mix stain with paste filler and completely fill pores in wood.

5. Galvanized Metal Work: Clean oil, grease and other foreign materials from surfaces. Install vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.

6. Unprimed Iron, Steel, and Other Uncoated Metals: Where specified to be painted, prime with one coat of metal primer.

7. Shop Primed Metal Items: Touch up bare and abraded areas with metal primer before installation of second and third coats.

8. Coats shall be installed evenly and with full coverage. Finished surfaces shall be free of sags, runs and other imperfections.

C. Allow at least 24 hours between coats of paint.

D. Rollers shall not be used on wood surfaces.

E. Each coat of painted woodwork and metal, except last coat, shall be sandpapered smooth when dry. Texture-coated gypsum board shall be sanded lightly to remove surface imperfections after first coat of paint has been installed.

F. Each coat of paint or enamel shall be a slightly different tint as required. Each coat of paint, enamel, stain, shellac, and varnish will be inspected by the IOR before next coat is applied. Notify the IOR that such Work is ready for inspection.

1. Tinting Guideline: The first coat, primer/undercoat(s) to be untinted or tinted up to 50% lighter or darker (at the discretion of the installer) than the finish coat. The second coat (or third coat if a seal coat and undercoat have been specified) is to be factory tinted in the range of 10% to 15% lighter or darker (at the discretion of the installer) than the finish coat. The final coat is to be factory tinted to the required color selected. These tinting guidelines shall be provided on all surfaces receiving paint.

G. Do not "paint-out" UL labels, fusible links and identification stamps.

H. Paint Roller, brush and spray.

1. Only Paint rollers shall be used on interior plaster, drywall, masonry/plaster and plywood surfaces, nap shall not exceed one half (1/2) inch in length.

2. First coat on wood overhang and ceilings shall have material applied by roller and then brushed out in a professional manner to leave surface free of imperfections. Finish coat may be sprayed.

3. All other surfaces shall have all coatings applied with brushes of proper size.

4. Spray work is permitted only on radiators, acoustic plaster, masonry and plaster.

I. Where ceilings are specified to be painted, beams, cornices, coves, ornamental features, plaster grilles, etc. shall be included.

J. All ceilings shall be white, including classrooms, storage rooms, offices, arcades, etc. Boiler room and fan room ceiling color shall match adjacent walls.

3.03 CLEANING

A. Remove rubbish, waste, and surplus material and clean woodwork, hardware, floors, and other adjacent Work.

B. Remove paint, varnish and brush marks from glazing material and, upon completion of painting Work, wash and polish glazing material both sides. Glazing material, which is damaged, shall be removed and replaced with new material.

C. Clean hardware and other unpainted metal surfaces with recommended cleaner. Do not furnish abrasives or edged tools.

3.04 SCHEDULE

A. Interior:

1. Woodwork, Painted: 3 coats.

   a. First Coat: As specified in this section under Priming.

   b. Second and Third Coats: Interior enamel, semi-gloss or gloss as indicated.

2. Woodwork, Stained and Varnished: 4 coats.

   a. First Coat: As specified in this section under Priming.

   b. Second, Third and Fourth Coats: Varnish, semi-gloss.

3. Wood Corridor doors: 4 coats.

   a. First Coat: As specified in this section under Priming.

   b. Second, Third, and Fourth Coats: Varnish, gloss.

4. Other Wood Doors: 4 coats.

   a. Varnished or painted as indicated.

   b. If varnished, same finish system as painted woodwork, with semi-gloss or gloss finish to match adjacent wall.

5. Miscellaneous Woodwork: 4 coats. Wood items including, but not limited to: stair treads and risers, handrails, rolling ladders, wood base and shoe, chair rails, counter tops and locker room benches.

   a. First Coat: As specified in this section under Priming.

   b. Second, Third and Fourth: Exterior varnish, gloss.

6. Casework: Interior surfaces of casework (except plastic laminate-faced casework) including top, edges and underside of shelving, poles, surfaces of drawers (except fronts), interior surfaces of mailbox pigeonholes, and particle board.

   a. First Coat: Waterborne stain.

   b. Second and Third Coats: Satin varnish.

7. Plaster: 4 coats.

a. First Coats: Pigmented wall sealer.

b. Second coat: Enamel under coater.

c. Third and Fourth Coats – Interior enamel, semi-gloss or gloss as indicated.

8. Gypsum Board: 4 coats.

a. First Coat: Drywall sealer.

b. Second Coat: Enamel under coater.

c. Third and Fourth Coats: Interior enamel, semi-gloss or gloss as indicated.

9. Concrete: 3 coats.

a. First: Concrete sealer.

b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.

10. Concrete Block: 3 coats.

a. First: Concrete block filler.

b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.

11. Metal: Shall be cleaned, pre-treated and painted with 3 coats. Items to be painted include, but are not limited to: exposed structural and miscellaneous steel, metal doors and frames, ladders, table and bench legs.

a. First Coat: Metal primer.

b. Second and Third Coats: Interior gloss enamel, except metal doors and frames which shall be semi-gloss or gloss to match adjacent wall.

B. Exterior:

1. Woodwork: 3 coats.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Exterior house and trim enamel.

2. Wood Doors: 3 coats.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Exterior gloss enamel.

3. Plaster and Stucco: 2 coats. Flat 100% acrylic.

a. Exterior 100 percent acrylic.

4. Concrete: 3 coats. Flat 100% acrylic.

a. First Coat: Concrete sealer.

b. Second and Third Coats: Exterior 100 percent acrylic.

5. Concrete Block: 3 coats. Flat 100% acrylic.

a. First Coat: Concrete block filler.

b. Second and Third Coats: Exterior 100 percent acrylic.

6. Metal: 3 coats. Shall be cleaned and pre-treated. Items to be painted include, but are not limited to: steel columns and miscellaneous steel items, gravel stops, metal doors and frames, hoods and flashings.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Exterior gloss enamel.

C. Mechanical and Electrical Work:

1. Except where interior mechanical and electrical Work to be painted is specified to receive another paint finish, Work occurring in finished rooms and spaces shall be cleaned, pre-treated, and painted with 3 coats. Items to be painted include, but are not limited to: steel and copper piping, pipes, vents, fittings, ducts, plenums, miscellaneous supports and hangers, electrical conduit, fittings, pull boxes, outlet boxes, unfinished surfaces of plumbing fixtures, miscellaneous metal cabinets, panels, and access doors and panels.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Interior enamel, semi-gloss or gloss to match adjacent wall or ceiling finish.

2. Insulation and Taping on Pipes and Ducts: 3 coats.

a. Finished Rooms:

- First Coat: Interior waterborne primer.

- Second and Third Coats: Interior semi-gloss or gloss enamel to match adjoining wall or ceiling finish.

b. Building Exterior:

- First Coat: Exterior waterborne primer.
- Second and Third Coats: Exterior gloss enamel.

3. Inside surfaces of ducts, vents, dampers and louvers as far back as visible from room in which they open shall be painted with 2 coats of flat black paint.

D. Miscellaneous:

1. Outside Storage Units (wood or metal): 3 coats.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Exterior gloss enamel.

2. Exterior and interior surfaces of storage bins, and potting tables shall have 3 coats of acrylic stain.

3. Wood compost bins shall be finished with 3 coats of acrylic stain.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 10 11 00

VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Wall mounted markerboards of size indicated on Drawings.

2. Horizontal sliding markerboards and map rail at media wall cabinets of size indicated on Drawings.

C. Related Sections:

1. Section 06 40 00: Architectural Woodwork: Media wall cabinets at classrooms.

2. Section 09 91 00: Paint and Coatings.

1.02 SUBMITTALS

A. Shop Drawings: Shop Drawings to indicate gages, profiles, sections of materials, details of construction, hardware, methods of attachment and/or anchoring, as applicable for specified materials.

B. Samples: Submit the following:

1. 3 inch x 5 inch markerboard Samples, provide manufacturer's full range of colors.

2. 3 inch x 5 inch sliding tackboard Samples, provide manufacturer's full range of colors and patterns.

3. 3 inch x 5 inch sliding bulletin board Samples, provide manufacturer's full range of colors.

C. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified.

D. Test Reports: Submit certified laboratory test reports as applicable to indicate compliance with specified requirements.

1.03 QUALITY ASSURANCE

A. Manufacturer shall have been regularly engaged in the business of manufacturing markerboards for at least 5 years.

B. Comply with requirements and recommendations of applicable portions of Porcelain Enamel Institute - PEI 2.

1.04 PRODUCT HANDLING

A. Deliver materials to the Project site with manufacturer's labels intact and legible.

B. Provide all means necessary to protect markerboards before, during and after installation.

1.05 JOB CONDITIONS

A. Sequencing, Scheduling:

1. Coordinate with related Work of other sections including gypsum board and tackboards.

2. Do not install markerboards until paint is installed to surfaces concealed behind them.

1.06 SPECIAL PROJECT WARRANTY

A. Manufacturer shall provide a 50 year material warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS (MARKERBOARDS)

A. Greensteel, Inc., a division of Polyvision Corporation.

B. Nelson Adams.

C. Claridge Inc.

2.02 SYSTEM PERFORMANCE

A. System shall be comprised of factory assembled markerboards, in configurations and sizes indicated on the Drawings or as specified herein.

B. Laminations of panel components shall be by face sheet manufacturer.

2.03 MATERIALS

A. Wall-Mounted Markerboards: Greensteel "AZ" Series, as a standard of quality:

1. Dry markerboards shall be porcelain enamel steel manufactured to exceed the performance specifications for porcelain enamel S104 of the Porcelain Institute. Markerboards shall be capable of supporting papers by means of magnets. The writing surface shall resist wear and damage from shock and abrasion and shall not dent, shatter or crack. The surfaces shall retain original color, writing, and erasing qualities and shall not become glossy or shiny in normal use. The gloss variation of a surface shall not exceed 3 units when measured by a 45 degree gloss meter in accordance with the Porcelain Enamel Institute Bulletin 1-18 Gloss Test for Porcelain Enamels and ASTM C 346.

2. Steel: Base metal shall be high quality enameling iron or steel of low metalloid and copper content, especially manufactured and processed for temperatures over 1,400 degrees F. used in coating porcelain on steel units for Architectural purposes; minimum 24 gage.

3. Facing Surfaces:

    a. Board surfaces shall consist of the following:

        1) Primer coat, 0.0025 inch minimum thickness.

        2) Vitreous-porcelain writing surface coating of 0.0025 inch minimum thickness.

        3) The reverse side of the steel base sheet shall receive a ground coat of 0.0005 inch thickness and a spray coat of silicon.

        4) The panel edges at butt joints shall be porcelain enamel.

        5) Fuse cover and ground coats to the steel at the manufacturer's standard firing temperature, but at least 1,250 degrees F.

4. The dry markerboard surfaced steel shall be factory laminated to 7/16 inch thick fiberboard core. A moisture blocking backing sheet shall be provided.

    a. Fiberboard Core shall be #45 pound particle board.

    b. Moisture Barrier Backer Sheet shall be minimum .015 aluminum or 28 gauge galvanized steel. Backer sheet shall be factory laminated to the core under pressure.

5. Lamination: The surface facing and the backing shall be bonded to the core material by means of a special flexible adhesive developed for this purpose with no unbonded area. The face and back shall not be removable without rupturing the core material. Panels shall not delaminate under normal use.

6. Joints: Where vertical joints occur, a 14 gage continuous concealed steel spline shall be fitted tightly into grooves in the core material. Factory rabbet to produce a smooth butt joint. Do not furnish exposed trim.

7. Edge Trim:

   a) Alloy 6063-T5, extruded, anodized satin finish aluminum.

8. Chalktray: Furnish manufacturer's standard continuous flat-ribbed or box-type aluminum chalktray with stained front and cast plastic end closures for each chalkboard and markerboad.

   a. Extend chalktray to end of both vertical edges of the board.

   b. On flat-rib tray, provide 3/4 inch radius on corners and polish at ends.

9. Map Rail: Furnish map rail at the top of each unit, complete with the following accessories:

   a. Display rail: Provide continuous cork display rail two inch wide, as indicated, integral with the map rail. Extend display rail to end of both vertical edges.

   b. End stops: Provide one end stop at each end of the map rail.

   c. Map hooks: Provide 2 map hooks with flexible paper holder clips for each 8 feet of map rail or fraction thereof.

   d. Roller Map Bracket: Provide 2 for each 8 feet of map rail or fraction thereof

B. Horizontal Sliding Markerboards (at Media Walls): Greensteel FXT (Top Supported) and FXB (Bottom Supported) Series, as a standard of quality.

1. Frame: Heavy-duty aluminum.

   a. Top Supported Trolley System.

      1) Top Track/Carrier: 642T Track with 2 # 7000-15 adjustable ball bearing carriers per panel. Provide rubber bumpers at ends of track.

      2) Bottom Guide Channel: NACO C4 Channel, or equal.

   b. Bottom Supported Trolley System .

      1) Top Guide Channel: NACO 224T Channel, or equal.

      2) Bottom Carrier: NACO 640T track with Grant #1415N sheave rollers, or equal. Provide rubber bumpers at ends.

2. Markerboard: 24 ga. porcelain enamel steel laminated to 7/8 inch thick honeycomb core with moisture barrier backing sheet of 0.015 aluminum and NACO C-12 Trim at perimeter and nylon guides at guide channel edge.

   a. Markerboard facing color: #6100H White, unless otherwise indicated on Drawings.

   b. Pulls: Ives No. 230, or equal. Provide 2 recessed pulls per panel at jambs.

3. Map Rail, surface mounted 2"width: NACO MR-3, with insert and end stops, or equal.

   a. Combination Maphook/Clip: NACO H-2, or equal. Provide 2 for each 8 feet of map rail or fraction thereof.

   b. Roller Map Bracket: NACO RB-2, or equal. Provide 2 for each 8 feet of map rail or fraction thereof.

4. Chalktray: NACO modified CRC-2B Chalktray, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install markerboard, trim, map rail and marker tray in accordance with manufacturer's directions and reviewed Shop Drawings. Fasteners for assembly of trim and frame units shall be truss head aluminum or stainless steel self-tapping screws with double cadmium-plated finish.

B. Install panels after finish painting of wall surfaces has been completed and paint is cured. Install panels level, plumb and neatly assembled. Before Substantial Completion, trim shall be completely cleaned of dirt, finger-marks, or other foreign material.

C. Install panel guides, spacers, and panels at media wall cabinets as indicated.

3.02 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Interior and exterior accessibility, identification, directional and informational signs.

2. Parking signs.

3. Exterior building signs.

C. Related sections:

2. Section 08 11 13: Hollow Metal Doors, Windows and Frames.

3. Section 08 21 00: Wood Doors.

4. Division 9: Finishes.

5. Section 14 21 00: Electric Traction Elevators.

1.02 REFERENCES

A. Regulatory Requirements:

1. CAS/CAR – California Accessibility Statutes and California Accessibility Regulations current edition.

2. California Building Code, Title 24.

3. California Title 19.

4. ADA Design Guidelines, current edition.

B. Standards:

1. ANSI A117.1, Standard for Accessible and Usable Buildings and Facilities.

2. ASTM D4802 Standard Specification for Poly (Methyl Methacrylate) Acrylic Plastic Sheet.

3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

4. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.03 SUBMITTALS

A. Product Data: Submit material descriptions, finishes and color charts for each type of sign.

B. Shop Drawings: Submit Shop Drawings indicating sign style, lettering, overall dimensions and quantities. Submit floor plans showing locations for each sign.

C. Material Samples: Submit three samples illustrating full size sample sign, of type, style and color specified.

D. Manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. Pre-Installation Conference: Notify OAR when signs are ready for installation. Arrange for conference at site. Do not proceed with installation until Architect's approval of specific locations and methods of attachment has been obtained.

B. Provide signs from one manufacturer, unless otherwise approved.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site and protect from damage. Store until immediately prior to installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.

1. H. Toji and Company, Long Beach, CA.

2. Karman Ltd., Architectural Signs, Canoga Park, CA.

3. Vomar Products Inc., Canoga Park

4. ASI-Modulex, Inc., Culver City, CA.

5. Mohawk Sign Systems, Inc., Schenectady, NY.

6. Accent Signage Systems, Minneapolis, MN.

7. The Gruenke Company, Sheboygen Falls, WI.

2.02 FABRICATION

A. Material: Non-glare (matte), UV stable, suitable for interior and exterior use.

1. Substrate Panel: 1/8 inch minimum thick, integrally colored or clear, back foiled and back painted acrylic plastic, or laminated acrylic.

a) Corners shall be square.

b) Edges shall be square and eased.

c) Colors as selected by Architect from manufacturer's custom color range.

2. Characters and Symbols:

a) Computer cut raised characters and graphics shall be cut from 1/16 inch integrally colored acrylic. Raised characters and graphics shall be inlaid 1/32 inch into first surface of sign background, secured with adhesive so it cannot be removed without the use of tools. Raised characters and graphics shall have beveled, eased or rounded edges. All non-tactile text and graphics shall be applied to the second surface, and background color shall be applied to the second surface and protected with film or an additional backplate.

b) Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, are not required to be raised.

c) Braille characters: Inlaid optically correct acrylic Raster beads into computer drilled holes in the panel surface.

3. Fasteners:

a) Stainless steel tamper-proof screws and plastic anchors.

b) Signs mounted on fire-rated doors shall be secured with adhesive.

c) Adhesives and sealants shall comply with the limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24).

B. Exterior Sign Materials:

1. Sign: 0.080 inch aluminum with rounded corners at least 1/8 inch radius and eased edges. White figure on a blue background; non-glare, high

contrast signs. The blue shall be equal to color number 15090 in Federal Standard 595B.

2. Post: 2 by 2 inch galvanized steel tubing, weighing minimum of 4.31 pounds per foot and conforming to ASTM A500, Grade B, 3/16 inch thick wall thickness.

2.03 SIGNS AND IDENTIFICATION GENERAL:

A. Finish and Contrast: Characters, symbols and their backgrounds shall have a nonglare finish. Characters and symbols shall contrast with their backgrounds, either light on dark background or dark on light background.

B. Proportions: Characters on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10.

C. Character Height: Visual (non-tactile) characters and numbers on signs shall be sized according to the viewing distance which they are going to be read. The minimum height shall be measured using an uppercase X. Lowercase characters are permitted. For signs suspended or projected above the finish floor the minimum character height shall be 3 inches.

1. Lettering Style: Non-decorative non-script fonts. Oblique or italic fonts shall not be used. Use upper and lower case characters, except for headings, emphasis, or regulatory signs that require all uppercase.

D. Raised Characters and Pictorial Symbol Signs: When raised characters are indicated or when pictorial symbols (pictograms) are used on such signs, they shall conform to the following requirements:

1. Character Type: Characters on signs shall be raised 1/32 inch minimum and shall be sans serif uppercase characters accompanied by Grade 2 Braille, per Article 2.03, E.

2. Character Size: Raised characters shall be a minimum of 5/8 inch and a maximum of 2 inches high.

3. Pictorial Symbol Signs (pictograms): Pictorial symbols, other than the International Symbol of Accessibility, shall be accompanied by the verbal description placed directly below the pictogram. The outside dimension of the pictogram field shall be a minimum of 6 inches in height.

4. Character Placement: Characters and Braille shall be in a horizontal format. Braille shall be placed a minimum of 3/8 inch and a maximum of 1/2 inch directly below the tactile characters: flush left or centered. When tactile text is multilined, all Braille shall be placed together below all lines of tactile text.

E. Braille: Only Contracted Grade 2 Braille shall be used. Dots shall be 1/10 inch on centers in each cell with 2/10 inch space between cells, measured from the

second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch above background. Braille dots shall be domed or rounded.

F. Mounting Locations and Height:

1. Identification signs for rooms and spaces shall be installed on the wall adjacent to the latch side of the door.

a. Where there is no wall space on the latch side, including at double leaf doors, signs shall be placed on the nearest adjacent wall, preferably on the right.

b. Mounting location shall be determined so that a person may approach within 3 inches of signage (person's eye to sign) without encountering protruding objects or standing within the swing of a door.

2. Identification signs for rooms and spaces shall be located on the approach side of the door as one enters the room or space. Signs that identify exits shall be located on the approach side of the door as one exits the room or space.

3. Mounting height shall be 60 inches above the finish floor to the center line of the sign.

G. Symbols of Accessibility: The International Symbol of Accessibility (ISA) shall be the standard used to indentify facilities that are accessible to and usable by physically disabled persons.

1. Color of Symbol: The ISA shall consist of a white figure on a blue background. The blue shall be equal to Color No. 15090 in Federal Standard 595B.

2.04 ROOM IDENTIFICATION SIGNS

A. Room Identification Sign Types:

1. Room Identification Sign with Changeable Insert: 7 inches high by 9 inches wide, minimum, with 4 inches high by 9 inches wide window for name and title removable insert. Locate room name immediately below window, and centered above room number. Room name shall be 3/4 inches high minimum, and room number 1 inch minimum; and shall be accompanied with Braille indicators.

2. Room Identification Sign with Room Name and Room Number: 7 inches high by 9 inches wide, minimum. Room name shall be centered above room number. Room name shall be 3/4 inches high

minimum, and room number 1 inch minimum; and shall be accompanied with Braille indicators.

3. Room Number Sign: 7 inches wide by 4 inches high; room number, 1 inch high minimum, accompanied by Braille indicator immediately right.

B. Room Identification Sign for Restrooms: In addition to the room name and Braille indicator, furnish a male, female or male and female (unisex restrooms) pictogram, as may be the case. Restroom names shall be Women or Girls, Men or Boys, or Restroom (for unisex facilities). The outside dimension of the pictogram field shall be a minimum of 6 inches in height.

C. Room Identification Sign Requirements:

1. Finish and Contrast: Refer to Article 2.03, A.

2. Proportions: Refer to Article 2.03, B.

3. Raised Characters: Refer to Article 2.03, D.

4. Braille: Refer to Article 2.03, E.

5. Mounting Location and Height: Refer to Article 2.03, F.

2.05 TACTILE SIGNS

A. Tactile Exit Sign Types:

1. "EXIT".

2. "EXIT STAIR DOWN".

3. "EXIT RAMP DOWN".

4. "EXIT STAIR UP".

5. EXIT RAMP UP".

6. "EXIT ROUTE".

7. "TO EXIT".

B. Convenience Tactile Signs:

1. "EXIT WITH ALARM", on exit doors with an alarm.

2. "EXIT ONLY" or "EXIT STAIR ONLY", on exit doors and stair exit doors which lock from outside and does not allow a return.

C. Tactile Sign Requirements:

1. Finish and Contrast: Refer to Article 2.03, A.

2. Proportions: Refer to Article 2.03, B.

3. Raised Characters: Refer to Article 2.03, D.

4. Braille: Refer to Article 2.03, E.

5. Mounting Location and Height: Refer to Article 2.03, F.

2.06 SIGNAGE DIRECTING TO EXIT

A. At exits and elevators serving a required accessible space but not providing an approved accessible means of egress, provide signage indicating the location of accessible means of egress.

1. Finish and Contrast: Refer to Article 2.03, A.

2. Proportions: Refer to Article 2.03, B.

3. Character Height: Refer to Article 2.03, C.

4. Symbol of Accessibility: Refer to Article 2.03, G.

2.07 ASSISTIVE LISTENING DEVICE SIGN

A. Include International Symbol of Access for Hearing Loss with text "Assistive-Listening System Available at XXX". Use upper and lower case characters. Sign shall comply with the following requirements:

1. Finish and Contrast: Refer to Article 2.03, A.

2. Proportions: Refer to Article 2.03, B.

3. Character Height: Refer to Article 2.03, C.

4. Symbol of Accessibility: Refer to Article 2.03, G.

2.08 IDENTIFICATION SYMBOLS

A. Male Restroom Door Sign: 1/4 inch thick equilateral triangle with edges 12 inches long, with vertex pointing upward. A sign with International Symbol of Accessibility shall appear within equilateral triangle in contrasting color to it. Staff toilets shall be identified with words "STAFF ONLY", located below ISA.

B. Female Restroom Door Sign: 1/4 inch thick circle 12 inches in diameter. A sign with International Symbol of Accessibility shall appear within circle in contrasting color to it. Staff toilets shall be identified with words "STAFF ONLY", located below ISA.

C. Unisex Restroom Door Sign (Single occupancy restrooms): 1/4 inch thick circle, 12 inches in diameter with a 1/4 inch thick equilateral triangle with 12 inches long edges, superimposed on the circle and within the 12 inch diameter. Triangle and circle shall be of contrasting colors. A sign with International Symbol of Accessibility shall appear within equilateral triangle in contrasting color to it, followed by a verbal description "STAFF ONLY" directly below ISA.

D. Location and Mounting Height: Symbols shall centered on the door at a height of 60 inches from finish floor to center of sign.

2.09 ACCESSIBILITY ENTRANCE SIGNS AND PATH OF TRAVEL DIRECTIONAL SIGNS

A. Entrance Sign: Provide at each building entrance an International Symbol of Accessibility sign. Signs shall be visible to persons along approaching pedestrian ways. B. Directional Signs: Provide where indicated on the drawings with arrow indicators and International Symbol of Accessibility.

C. Signs shall be mounted on wall with lower edge between 48 inches and 60 inches above ground surface or finish floor. Pole mounted, overhead and projecting signs shall have the lower edge at least 80 inches from the ground surface or finish floor.

D. Sign shall comply with the following requirements.

1. Finish and Contrast: Refer to Article 2.03, A.

2. Proportions: Refer to Article 2.03, B.

3. Character Height: Refer to Article 2.03, C.

4. Symbol of Accessibility: Refer to Article 2.03, G.

E. No Smoking Sign: Provide at each building entrance. Reverse cut white vinyl sign with 4-1/2 inches high no smoking symbol, mounted on glass entry doors. Under No Smoking symbol, place words "No Smoking", 1/2 inch high minimum, San Serif upper and lower case characters.

2.10 OCCUPANT LOAD SIGNS

A. Provide maximum occupancy load signs. Post in a conspicuous place near the main exit or exit access doorway from the room or space of rooms and areas indicated in the drawings:

B. Minimum size: 4 inches high by 8 inches wide, 7/8 inch high letters, 1 inch high numerals.

C. Sign to read: "MAXIMUM OCCUPANCY LOAD XXX". Obtain occupant load information from Architect.

2.11 LIVE LOAD SIGNS

NOTE TO ARCHITECT: Provide "Live Load Signs" per CBC section 1607.3.5. Locate and identify signs on the drawings and indicate text. Provide live load for each sign.

A. Provide maximum durable metal live load sign where indicated on drawings. Post in a conspicuous place near main exit of room.

B. Minimum size: 4 inches high by 8 inches wide, 7/8 inch high letters, 1 inch high numerals.

C. Sign to read: "MAXIMUM LIVE LOAD XXX". Obtain live load information from Architect.

NOTE TO ARCHITECT: Locate "emergency gas shut-off" signs and identify signs on the drawings.

2.12 EMERGENCY GAS-SHUT OFF SIGN

A. Sign: 1/8 inch thick, with text to include: "Emergency gas-shut off valve."

B. Minimum size: 4 inches high by 8 inches wide, 7/8 inch high letters, 1 inch high numerals.

2.13 FIRE SPRINKLER RISER ROOM SIGN

A. Locate one sign at each fire sprinkler riser room door as indicated in drawings.

B. Text: Sign to read "Fire Sprinkler Riser Inside", white characters, 1 inch high on red background.

C. Sign Requirements:

1. Proportions: Refer to Article 2.03, B.

2. Raised Characters: Refer to Article 2.03, D.

3. Braille: Refer to Article 2.03, E.

4. Mounting Location and Height: Centered on the door Mounting and 60 inches above the finish floor to the center line of the sign.

2.14 SCHOOL NAME AND ADDRESS SIGN

A. Sign, indicating school name and address, shall be furnished with cast aluminum letters as manufactured by Andco Industries Corp., or equal.

B. Style: Helvetica Medium, Futura 444, Ribbon 555, 556 or 557 as selected.

C. Material: 0.064 inch aluminum construction, unless indicated otherwise.

D. Letter Size: School name shall be 10 inches high and address shall be 4 inches high, unless indicated otherwise.

E. Letter Copy and Design: As indicated on Drawings.

F. Finish: Finish shall be type H anodic clear or black, as selected by Architect

2.15 EVACUATION PLANS

A. Sign shall consist of a floor plan depicting the building layout. The words "Evacuation Plan" shall be included at the top of the plan in minimum 3/4 inch high characters. Interior spaces shall be indicated by shading and corridor shall be prominent and displayed in white. Sign shall provide emergency procedures information and instructions to be followed in the event of an emergency, and shall be printed with a minimum of 3/16-inch high non-decorative lettering providing a sharp contrast to the background. Emergency procedures information shall include, but not be limited to the following:

1. Viewer location symbol, "You are here" in the plan. Plan shall be oriented in each sign as required to correspond with the users view.

2. Location of exits with arrows leading to them.

3. Stair number and floor number.

4. Location of fire alarm initiating stations and fire extinguishers.

5. What the fire alarm sounds and looks like (audible and visual warning devices).

6. Fire department emergency telephone number 911.

7. Wording: "IN CASE OF FIRE USE STAIRWAY - DO NOT USE ELEVATOR", shall be indicated with 1/2 inch high characters.

B. Mount signs so that bottom edge is no more than 48 inches from the finish floor, and within close proximity to the building, stair or elevator entrance. The reader must be able to approach the sign without encountering any obstacle.

C. Evacuation Plans Requirements:

1. Finish and Contrast: Refer to Article 2.03, A.

2. Proportions: Refer to Article 2.03, B.

3. Character Height: Refer to Article 2.03, C.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means installer accepts existing surfaces/

3.02 METHODS OF INSTALLATION

A. Interior Identification Signs and Interior Directional Signs:

1. Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.

2. When concealed installation is specified, install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape.

3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.

B. Geometric Signs: Geometric toilet room signs shall be fastened to doors with 3 tamper-proof oval-head counter-sunk screws.

C. Exterior Post Mounted Directional Signs: Install by post mount. Size of required footing shall be as indicated.

D. Exterior Wall Mounted Identification Signs and Directional Signs:

1. Aluminum signs: Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.

a. Stucco, Brick or Masonry: Provide plastic anchors. For signs greater than 640 square inches use Leadwood Screw Anchors, concrete fasteners 1WSA 10112, or equal.

b. Chain Link Fence: Fasten with 9 gauge hog rings, King Hughes Fasteners 5150DG50, or equal, with 11/16 inch opening at all four corners of sign.

c. Wrought Iron Fence: Install at each corner with 3/16 inch stainless steel rivets.

2. Acrylic signs: Install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape and silicone.

E. Exterior Building Sign:

1. Each letter shall be furnished with a minimum of 3 cast mounting lugs on backside, drilled and tapped to receive installation bolts.

2. Letters shall be installed according to manufacturer's method PMC-1. Letters shall be installed 3/4 inch away from wall surface, by an aluminum sleeve spacer.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.04 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Solid phenolic toilet compartments, urinal screens, and vision screens as indicated.

C. Related Sections:

1. Section 05 41 00: Load Bearing Metal Studs

2. Section 10 28 13: Toilet Accessories

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Design and fabrication shall conform to requirements of ADA and CBC.

B. Toilet Compartments: Floor supported overhead braced type units consisting of solid phenolic pilasters, panels and doors; plated steel leveling devices with stainless steel covers; and stainless steel fittings, hardware and fastenings necessary for complete installation.

C. Urinal Screens: Floor supported and wall hung type consisting of solid phenolic screen panels and plated steel leveling devices with stainless steel covers, stainless steel fittings and fastening necessary for complete installation.

D. Vision Panels: Floor- and wall-mounted solid phenolic type.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating complete layout, elevations of partitions, thickness of solid phenolic panels, fastenings, proposed method of anchoring, size and spacing of anchors, details of construction, hardware, fittings, mountings, method of assembly, other related items, and installation details.

B. Product Data: Submit manufacturer's technical data for materials, fabrication, finishing, fastenings, hardware, and installation details.

C. Material Samples:

1. Submit full range of Samples of phenolic chips for initial color selection. Chips shall be at least 2 inches x 3 inches.

2. Submit Samples of hardware and fasteners.

D. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

1.04 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. ASTM A167: Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

2. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

3. Chemical Resistance: Panels to meet or exceed Scientific Equipment Furniture Association's (S.E.F.A.) list of 49 standard chemicals.

4. Consistency:

a. Panels to have uniform thickness (+0.03").

b. Panels to have uniform flatness (maximum difference of 0.03") for 10' span.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site with manufacturer's labels intact and legible, in sealed containers. Materials shall be kept dry.

B. Provide all means necessary to protect compartments and screens.

1.06 COORDINATION

A. Field Measurements: Secure field measurements before preparation of Shop Drawings and fabrication where possible, for proper and adequate fabrication and installation of the Work of this section.

B. Furnish inserts and anchorage built into other construction for installation of toilet compartments, urinal screens and vision panels.

1.07 WARRANTY

A. Manufacturer shall provide a 10 year material warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Solid Phenolic Panels:

1. Formica Solid Phenolic panels with -42 sparkle finish, Formica Corporation.

2. Trespa Athlon DSQ panels, Trespa North America Ltd.

3. Pionite Phenolic Panels.

4. Or equal.

B. Hardware:

1. Galaxy Hardware, Series 8033.

2. Or equal.

2.02 MATERIALS

A. Toilet compartments panels, doors and pilasters; urinal screens and visual screens.

1. Core: Phenolic impregnated Kraft papers. Panel shall be at least 93 pounds per cubic foot to ensure full saturation of Kraft core.

2. Face Sheet: Separate sheet of clear melamine over decorative papers impregnated with melamine resin and integrally compression molded with the core.

3. Fire Resistance: The panels shall have the following surface burning characteristics and smoke generation values in accordance with UL classification and labeling in accordance with ASTM E84 tests and shall be self-extinguishing.

a. Flame spread: Maximum 30 for 3/4 inch thick panels; 30 for 1/2 inch thick panels.

b. Smoke developed: Maximum 70 for 3/4 inch thick panels; 85 for 1/2 inch thick panels.

4. Panels shall be UL registered and labeled.

5. Panel shall be resistant to cleaning solvents and uric acid.

6. Product/Material Specification:

a. Modulus of Elasticity: 1.5 million psi minimum

b. Shear Strength: 2,000 psi minimum

c. Compressive strength: 24,000 psi minimum.

d. Water Absorption: 3% maximum

e. Use Temperature: 350° F maximum

f. Surface and Edges: Non-porous

g. Material Resistance: Will not support fungus or bacteria

h. Uniform Load Deflection: ¼" maximum per Table A

Table A: Uniform Load (lbs) which causes ¼" deflection at Center (Shelves not fixed at either end, static load on E modulus of 2.0 x 106)*

Uniform Load in pounds

Thickness	12" by 24"	12" by 36"	12" by 48"	24" by 36"
½"	370	110	45	220
¼"	1,400	400	170	800

* Loads can be affected by temperature, humidity, time, and other environ-mental factors. Users should test shelves in appropriate environment. It is assumed that deflection grater than ¼" is undesirable aesthetically, even though rupture has not occurred.

B. Stainless Steel: ASTM A167, Type 304.

C. Concealed Fasteners and Leveling Devices:

1. Concealed Fasteners: Stainless steel.

2. Leveling Devices: Zinc or cadmium coated steel, or stainless steel.

2.03 CHARACTERISTICS

A. Doors shall be minimum 3/4 inch thick, panels minimum 1/2 inch thick, pilasters minimum 3/4 inch thick and screens minimum 1/2 inch thick. Edges shall be machined to a radius of 0625 inch; exposed surfaces shall be free of fabrication marks.

2.04 FABRICATION

A. Pilasters and Doors: Flush, formed of 3/4" thick solid phenolic panels.

1. Door Dimensions: Unless otherwise indicated, furnish 24" wide in-swinging doors for standard toilet compartments, 36" wide clear opening out-swinging doors when located at the end, and 36" wide clear opening out-swinging doors when located at the side for stalls equipped for use by the physically disabled.

2. Doors at Accessible front entry stalls shall have 32" minimum clear width when the door is open 90 degrees per CBC Section 1115B.3.1.4.4. Doors at Accessible side entry stalls shall have 34" minimum clear width when the door is open 90 degrees per CBC Section 1115B.3.1.4.4.

3. Anchorage: Provide stainless steel anchorage, complete and threaded rods, washers, and leveling adjustment nuts at pilasters, to permit connection to floor slab. Furnish devices, which are designed to support pilasters from structure without transmitting load to floor fill.

4. Overhead Bracing: Provide anti-grip, decorative, heavy duty, extruded aluminum head rail with clear anodized finish.

B. Panels and Urinal Screens: Flush, formed of 1/2" thick solid phenolic panels. Height and width as indicated in drawings.

2.05 HARDWARE

A. Door hardware shall be cast Type 304 stainless steel, as follows:

1. Hinges: 11 gauge Cast Stainless Steel Hinge. Hinge shall be cast of type 304 stainless steel and shall have a Satin finish. Hinge shall be gravity type for self-closing action and shall be fully adjustable up to 360 degrees. Pivot pin shall be made of type 304 stainless steel. Only stainless steel components shall be used in the construction of the Hinge. Plastic inserts are unacceptable. Hinges shall provide emergency access by lifting the door. Hinges shall be pre-drilled for mounting to door and plaster with Stainless Steel through-bolts. Stamped stainless steel is not acceptable.

2. Strike and Keeper with Emergency Access: Heavy duty cast stainless steel with a Satin finish. The strike and keeper shall be 2.50" high, with the mounting holes at 1.50" on center, and the wall thickness shall be a minimum of .125". The strike and keeper shall have an integral rubber bumper door stop. The stock number shall be molded into the back of the strike and keeper for ease in identification. Furnish one per door. Stamped stainless steel is not acceptable.

3. Slide Latch: Heavy Duty Cast Stainless steel with a Satin finish. The slide latch shall be surface mounted. The slide bar shall be .150" thick, 1.020"

wide and 3.720" long. Latch shall have an internal stainless steel buffering spring to prevent damage when door is inadvertently slammed against the latch. Mounting holes are to be spaced at 3.50" on center. Latch knob is to be riveted to the slide bar and then welded to insure that the knob will not come off. The stock number shall be molded into the back of the slide latch for ease identification. Furnish one per door. Stamped stainless steel is not acceptable.

4. Coat Hook: Heavy Duty Cast Stainless Steel with a Satin finish. Coat Hook and bumper shall be 2.340" high, 1.230" wide and shall protrudes out from the door 3.05". The hook portion shall have a finished diameter of .250" thick. The stock number shall be molded into the back of the Coat Hook and Bumper for ease in identification. Furnish one per door. Stamped stainless steel is not acceptable. Mount at 48 inches maximum above finished floor in accessible toilet compartments.

5. Door Stop: Heavy Duty Cast Stainless Steel with a satin finish. Plated Zamac Door stops are unacceptable. Door Stop shall have a 2.125" base diameter and shall protrude 1.80" from the Wall. The bumper at the end of the Door Stop shall be .250" thick. The diameter of the shaft shall be .6875". The stock number shall be molded into the back of the Door Stop for ease in identification. Furnish one for each Disabled Accessible door. Stamped stainless steel is not acceptable.

6. Pull Handle: Heavy Duty Cast Stainless Steel with a Satin finish. Plated Zamac Door pulls are unacceptable. Pull Handle shall protrude from the face of the door .940" and shall be 4.735" long. The Pull Handle shall have mounting holes drilled and tapped for 10/24 threads at 3.50" on center. The Pull Handle shall be .655" wide and shall be mounted back to back with the Slide Latch. The stock number shall be molded into the back of the Pull Handle for ease in identification. Stamped stainless steel is not acceptable. Provide u-pull shape handle on each side of accessible toilet compartment doors.

B. Pilaster Shoes: ASTM A167, Type 302/304 Stainless Steel, minimum 3" high, 15 gauge, finish with #3 Directional polish, attached with Stainless Steel Through Bolts.

C. Brackets: One piece double ear bracket or single ear bracket (at end partition) extending within 3 inches of top and bottom panel edges. Extruded 6063-T5 Aluminum with a satin anodized finish. The minimum weight shall be 1.685 pounds per lineal foot. Inside opening of Bracket shall be .50" for panels, .75" for pilasters. All holes for mounting to wall and panel/pilaster shall be pre-drilled. Holes are to be spaced at 9" on center along the full length of the Bracket for a total of twelve holes (double ear) for mounting to the wall and six holes (single ear) for mounting to the panel/pilaster. Each Bracket is to have a minimum wall thickness of .125".

D. Overhead Bracing (Headrail): Continuous heavy duty extruded 6063-T5 Aluminum Headrail with anti-grip profile. Head rail shall have integral reinforcing channel and curtain track. Head rail shall have Satin Anodized finish.

Provide headrail corner brackets, wall brackets, and headrail end caps as required. The headrail and headrail brackets shall have a minimum wall height of 2". The minimum wall thickness of the headrail and head ail brackets shall be .125".

E. Chrome-plated, non-ferrous cast alloy material shall not be furnished for hinges, brackets, locks, latches and other fittings and accessories.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before covering wall framing with finish materials, examine framing to ensure that backing plates and structural framing have been installed in such position as to receive all attachment screws.

B. Verify spacing of plumbing fixtures to ensure compatibility with installation of compartments.

C. Do not start the Work of this section until all deficiencies have been corrected.

3.02 INSTALLATION

A. Install partitions and screens as shown in the Shop Drawings and in accordance with manufacturer's instructions and as specified. Install straight, level and plumb.

B. No evidence of drilling, cutting or patching shall be visible in finished Work.

C. Fasten panel brackets securely to walls and ceilings with recommended anchoring devices.

D. Fasten panels and pilasters to brackets with through bolts and nuts.

E. Fasten urinal screen panels to walls with 2 panel brackets, minimum.

F. Provide 1/2 inch spaces between wall surface and panels or pilasters.

G. Provide for adjustment of floor variations with non-breakable plastic shoes on pilasters. Conceal floor fastenings in pilaster shoes.

H. Furnish each toilet compartment door with top and bottom hinges, and door latch.

I. Install door strike keeper on each pilaster in alignment with door latch.

J. Furnish each toilet compartment door with one coat hook and bumper.

3.03 TOLERANCES OF INSTALLED WORK

A. Maximum Variation from Plumb or Level: 1/8 inch.

B. Maximum Misplacement from Intended Position: 1/8 inch.

3.04 ADJUSTING AND CLEANING

A. Hardware Adjustment: After installation, adjust hardware for proper operation. Install hinges on in-swinging doors to hold open approximately 30 degrees from the closed position when unlatched. Install hinges on out-swinging doors to return to the fully closed position. Adjust doors so that bottoms of doors are level with the bottoms of the pilasters when the doors are in the closed position.

B. Adjust and align door hardware to uniform clearance at vertical edges of doors. Clearance space shall not exceed 1/4 inch.

C. Cleaning: Clean compartments, hardware, and doors before Substantial Completion and leave free from imperfections. Remove protective coverings.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Toilet accessories as indicated.

C. Related Sections:

1. Section 05 41 00: Load Bearing Metal Studs

3. Section 10 21 13: Toilet Compartments.

1.02 SYSTEM DESCRIPTION

A. Regulatory Requirements: Comply with CBC requirements and ADA recommendations for accessibility.

1.03 SUBMITTALS

A. Shop Drawings: Submit a schedule of accessories and Shop Drawings indicating installation methods and fasteners.

1.04 QUALITY ASSURANCE

A. Coordinate related Work as required to ensure proper and adequate provision in framing of backing and wall finish for installation of accessories.

B. Coordinate requirements of Section 10170: Solid Phenolic Toilet Compartments to ensure that correct openings are provided in partitions for toilet accessories where required.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect accessories from damage.

PART 2 - PRODUCTS

2.01 GENERAL

A. Accessories shall be provided with necessary anchoring devices and fasteners appropriate for surfaces on which items are to be fastened.

B. All accessories shall be from the same manufacturer except electric hand-dryers.

2.02 MATERIALS

A. Liquid Soap Dispenser: 20 gage stainless steel, 40 oz. capacity, tamper-proof cap and concealed vandal-proof mounting. Continental V 444SS, ASI 0343, Bobrick B-2111,, or equal.

B. Toilet Paper Boxes:

1. For Elementary School (ES) Student Restrooms:

a. Non-accessible toilet compartments: Surface mounted, Bobrick B-2888, or equal..

b. Handicapped accessible student toilet rooms or compartments: semi-recessed Bobrick B-3888, ASI-0031, Bradley 5412 (double roll tissue holder without paper roll spindle stops), or equal.

C. Classroom Paper Towel Boxes: Surface mounted, Type 304 stainless steel, satin finish. Door with tumbler lock and piano hinge ASI 0245-SS, Bobrick B-263, Crown Zellerbach,, or equal.

D. Grab Bars: 1-1/4 inches diameter by 18 gage stainless steel tubing, of size and configuration indicated. Ends shall be screwed to 11 gage stainless steel wall plate, with snaplock cover flanges. Grab bars over 36 inches in length shall be furnished with stainless steel support at mid point. Exposed stainless steel to be 180 grit satin finish. ASI 3700 series, Bobrick B-5806 series, Tubular Specialties Manufacturing, Inc. series Q-CS-1, or equal.

F. Mirrors: Framed mirror, with one piece roll-formed 3/4 inch x 3/4 inch Type 304 stainless steel angle frame, with satin finish. Corners shall be heliarc welded, ground and polished smooth. Glass shall be No. 1 quality 1/4 inch float/plate glass, electrolytically copper-plated. Frame shall be furnished with a continuous integral stiffener on sides. Back of mirror shall be protected by 1/8 inch thick, waterproof, shock-absorbing polyethylene padding and 20 gage galvanized steel back attached to frame with concealed screws. Mirror shall be provided with a 20 gage wall hanger. ASI 0600, Bobrick B-290 series, or equal. **18" x 30"**.

G. Toilet Seat Cover Dispensers:

1. For Elementary School (ES) Student Restrooms:

a. Non-accessible toilet compartments: Surface-mounted, Type 304 stainless steel, satin finish. ASI 0477SM, Bobrick B-221, or equal.

b. Handicapped accessible student toilet rooms or compartments: Recessed Bobrick B-301, or equal.

I. Combined Toilet Seat Cover and Toilet Paper Dispensers Surface-mounted, Type 304 stainless steel, satin finish. ASI 0477SM, Bobrick B-221, or equal.

1. For High School (HS) Student Restrooms:

   a. Non-accessible Boys toilet compartments: Partition-mounted, Type 304 stainless steel, satin finish. Bobrick B-3471, or equal.

   b. Handicapped accessible Boys student toilet rooms or compartments: Recessed, Type 304 stainless steel, satin finish. Bobrick B-3474, or equal.

   c. Non-accessible Girls toilet compartments: Partition-mounted, Type 304 stainless steel, satin finish. Bobrick B-3571, or equal.

   d. Handicapped accessible Girls student toilet rooms or compartments: Recessed, Type 304 stainless steel, satin finish. Bobrick B-3574, or equal.

J. Sanitary Napkin Vendors

   1. Vendors (In HS Girls Restrooms only): Recessed, Type 304 stainless steel, satin finish, tumbler lock, single 25 cent coin operation. Bobrick B-352 25, napkin/tampon dispenser, or equal.

L. Waste Receptable: Recessed, Type 304 stainless steel, satin finish. Bobrick B-3644, or equal.

M. Restroom Electric Hand-dryer: Warm air, high speed, energy efficient self-contained electric hand dryers. Dryer to be MADE IN USA Certified. Comply with ICC/ANSI A117.1. Equipment certified by Underwriters Laboratory, Inc., with UL labels. Hand Dryer: XLERATOR; surface mounted; entire dryer internally grounded or equal.

   1. Warranty Period: 5 years; limited warranty.
   2. Controls: Automatic, activated by infrared optical sensor. Operates while hands are under blower. Shut-off within 2 seconds when hands removed, or in 35 seconds if hands not removed.
   3. Cover: One piece, heavy duty, rust-resistant, rib-reinforced, die-cast zinc alloy.
      a. Finish: Stainless steel with brushed finish – Model XL-SB
   4. Air Intake: Inlet openings on bottom of cover.
   5. Air Outlet: Delivers focused air stream at average hand position of 4 inches (102 mm) below air outlet.
   6. Noise Reduction Nozzle: 1.1 noise reduction nozzle.
   7. Wall Plate: Injection molded, rib reinforced plate with metal L brackets to attach cover, with ten 5/16 inch (8 mm) diameter holes for surface mounting to wall and three 7/8 inch (22 mm) diameter holes for electrical wiring; bottom hole suitable for surface conduit.
   8. Recess Kit – provide at stud walls: ADA compliant recess kit is fabricated of 22 GA 18-8 type 304 stainless steel with #4 satin finish with 16 GA18-8 type 304 stainless steel dryer mounting plate. All welded construction.

16-3/8 inches (416 mm) wide by 26 inches (660 mm) high by 3-3/8 inches (86 mm) deep.

9. Nominal Size: 11-3/4 inches (298 mm) wide by 12-11/16 inches (322 mm) high by 6-11/16 inches (170 mm) deep.
10. Combination Motor and Blower: Series commutated, through-flow discharge, vacuum type; 5/8 HP, 20,000 RPM. Air flow rate: 19,000 linear feet per minute (97 meters per second) at air outlet, 16,000 linear feet per minute (81 meters per second) at average hand position of 4 inches (102 mm) below air outlet.
11. Heater: Nichrome wire element, mounted inside blower housing to be vandal proof.
12. Heater Safeguard: Automatic resetting thermostat to open when air flow is restricted and close when air flow is resumed.
13. Air Temperature: 135 degrees F (55 degrees C) measured at average hand position of 4 inches (102 mm) below air outlet. Air Heater Output: 900 watts.
14. All metal parts coated according to Underwriters Laboratories, Inc. requirements.
15. Mount dryers at heights indicated on Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Check openings in substrates to receive accessories. Verify openings are correctly located and sized to receive accessories, and that locations will comply with disability access requirements. Confirm that blocking, backing or support is properly located and adequate for the accessory installation.

B. Verify spacing of plumbing fixtures and toilet partitions. Confirm spacing and locations are compatible with proposed accessory locations and will allow compliance with disability access requirements.

3.02 INSTALLATION

A. Install toilet accessories for Accessible stalls at mounting heights according to CBC Section 1115B.8.

B. Install toilet accessories in accordance with manufacturer's written recommendations and accessibility requirements. Fasten components firmly in place.

C. Drill holes to correct size and application that is concealed by item with ¼ inch tolerance.

D. Install recessed accessories into wall openings with sheet metal screws into metal frames.

E. Install surface-mounted accessories to backing plates with machine screws, plumb, and aligned.

F. Grab Bars:

1. Fasten to toilet partition with 3-inch diameter stainless steel back plates with studs, couplings, and stainless steel machine screws.

2. At metal stud walls, provide 1/8 inch cold-rolled steel plate, drilled and tapped for machine screws, or 16 gage cold-rolled steel plate complete with threaded sleeves for stainless steel machine screws. Weld plates to studs.

3. At concrete or masonry walls, install bars with sheet metal screws and expansion anchors.

4. At plaster or gypsum board walls, provide spacers of same thickness as wall material to prevent crushing of wall material.

5. Grab bars can not project more than 3" into the 48" minimum clear space in front of the water closet

G. Mirrors: Install mirror on manufacturer supplied concealed wall hanger and fasten with 2 theft-resistant locking screws.

H. Toilet paper and feminine napkin dispensers located on the grab bar side of an accessible toilet room or stall should not project more than the grab bar. The accessory shall not be located closer than 1 ½" clear of the tanget point of the grab bar. Accessories surface mounted above grab bar will restrict usability.

I. Before Substantial Completion, deliver keys and maintenance instructions and product data to OAR.

3.03 ADJUSTING AND CLEANUP

A. Adjust accessories for proper operation.

B. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Fire Extinguishers and Cabinets.

C. Related Sections:

1. Section 05 41 00: Load-Bearing Metal Studs.

3. Section 09 29 00: Gypsum Board.

1.02 SUBMITTALS

A. Shop Drawings: Indicate materials, sizes, anchorage, and installation details.

B. Product Data: Submit manufacturer's product literature, indicating product characteristics.

C. Material Samples: Submit manufacturer's standard cabinet color Samples for selection by Architect.

1.03 QUALITY ASSURANCE

A. Installer shall be manufacturer trained and certified to install the Work of this section.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's wrapping to protect items.

B. Store items in a dry, enclosed area.

PART 2 - PRODUCTS

2.01 FIRE EXTINGUISHERS AND CABINETS

A. Location: Fire extinguisher cabinets and fire extinguishers shall be installed where indicated on Drawings or as required by authorities having jurisdiction.

B. Manufacturer: Fire extinguishers and cabinets shall be manufactured by one of the following:

1. Potter-Roemer
2. J. L. Industries
3. Larsen's Manufacturing
4. Modern Metal Products, by Muckle
5. Waltrous
6. Amerex (fire extinguishers)

C. Fire Extinguisher Type: Provide a legally appropriate rechargeable fire extinguisher for every fire extinguisher cabinet and as otherwise indicated.

1. Classrooms, Corridors, Administration and Special Use Rooms [Cabinet mounted]:

   Type ABC multi-purpose dry chemical with UL rating 2A:10B:C, 5 lb. size, also with red glossy polyester coated steel cylinder, pressure gage, hose and horn. Maximum Height: 15 ¼". Maximum Cylinder Diameter: 4 ½".

2. LAN Rooms [Bracket mounted]:

   Type Halotron 1, EPA approved "Clean Agent" with UL rating 5B:C, 5 lb. size, with red glossy polyester coated steel cylinder, discharge nozzle and bracket. Maximum Height: 15 ¼". Maximum Cylinder Diameter: 6". Provide 16 gage steel bracket by same manufacturer as extinguisher.

3. Electrical / Science Rooms, Boiler / Fan – Heating Rooms:

   Type CO2, carbon dioxide gas, with UL rating 5B:C. 10B:C, (5 lbs., with red glossy polyester coated aluminum cylinder, hose and horn.

Maximum Height, (not exceed): 17-3/4 inches. Maximum Cylinder Diameter, (not to exceed): 5-1/4 inches.

D. Fire Extinguisher Requirements:

1. Design Specification:

a. Finish: Corrosion and impact resistant red epoxy.

b. Valve Stem Assembly: Metal, reusable, connects to cylinder by threaded pipefitting, aluminum or steel siphon tube, and shatter resistant plastic face gage.

c. Gage (if applicable) to Indicate: "Recharge," "fully charged (195 PSI)," and "over charge."

d. Pull Pin: Metal, reusable and securely fastened to unit with metal, aluminum chain or very heavy plastic line approximately 4 ½" long.

e. Mechanical Operation: Pistol grip, heavy duty metal handle (plastic not permitted), and shall be operated by a grip and squeeze lever.

2. Manufacturer Identification/Information: Manufacturer's name, date manufactured, model number, U.L. approval seal and/or number, contents operating instructions, Fire Marshall approval, etc. shall be identified on the Fire Extinguisher.

3. Warning and First Aid Label: Fire extinguisher must indicate all standard warnings concerning breathing, eyes, skin and ingestion. Provide emergency and first aid procedures.

4. Property Identification: Label affixed at front of unit, size 2" x 4", shall read "PROPERTY OF GLENDALE UNIFIED SCHOOL DISTRICT".

5. Repair Parts: The manufacturer and/or their representative shall maintain within the Los Angeles Metropolitan Area an adequate stock of replacement parts, available for immediate delivery.

6. Warranty:

a. Manufacturer shall provide a 5 year material warranty.

b. Installer shall provide a 5 year labor warranty.

7. Material Safety Data Sheet: Provide an MSDS sheet with every shipment as set forth in the California Labor Code, Section 6390.

E. Fire Extinguisher Cabinet: Potter-Roemer cabinets are listed as the standard of quality, other manufacturers may be submitted as equal according to Division 01

1. Fully recessed cabinet: Provide fully recessed, square trim edge cabinet with 1/2" projection:

a. Potter-Roemer Fire Extinguisher Cabinet 7020:

1) Door Style: either DVL (Duo Vertical Panel with lock) or E (Center Break Glass with lock), glass to be clear tempered safety glass.

2) Cabinet Door and Frame: Cold rolled steel electrostatically applied, thermally fused polyester coating with recoatable white finish.

3) Identification Lettering: Cabinet door to be furnished with die cut lettering indicating "FIRE EXTINGUISHERS" in contrasting color to cabinet finish, and either vertical or horizontal lettering depending upon door style.

2. Semi-recessed cabinet: Provide semi-recessed, square trim edge cabinet with 1-1/4"to 2" projection:

a. Potter-Roemer Fire Extinguisher Cabinet 7022:

1) Door Style: either DVL (Duo Vertical Panel with lock) or E (Center Break Glass with lock), glass to be clear tempered safety glass.

2) Cabinet Door and Frame: Cold rolled steel with electrostatically applied, thermally fused polyester coating with recoatable white finish.

3) Identification Lettering: Cabinet door to be furnished with die cut lettering indicating "FIRE EXTINGUISHERS" in contrasting color to cabinet finish, and either vertical or horizontal lettering depending upon door style.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with manufacturer's recommendations.

B. Cabinets shall be installed plumb and level, where indicated on Drawings, at heights required by authorities having jurisdiction.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 12 21 00

WINDOW BLINDS
(INSTRUCTIONAL SPACES)

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Window darkening venetian blinds.

C. Related Sections:

1. Section 08 41 13: Aluminum Window, Doors and Frames.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings including plans, elevations, and installation details.

B. Product Data: Submit manufacturer's data and catalog cuts.

C. Material Samples: Submit manufacturers color Samples.

1.03 QUALITY ASSURANCE

A. Qualifications of Manufacturer: Manufacturer shall have been regularly engaged in the business of manufacturing products of this section for 5 years.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver in manufacturer's sealed and labeled containers. Store in a clean dry area.

PART 2 - PRODUCTS

2.01 GENERAL

A. Products of Levolor Lorentzen Inc., Hunter Douglas Inc., Springs Window Fashions LP, or equal.

2.02 MATERIALS

A. Provide the following:

1. Riviera 2, horizontal aluminum blind by Levolor Lorentzen Inc.

2. Flexalum horizontal aluminum blind by Hunter Douglas Inc.

3. Bali, horizontal aluminum blind, by Springs Window Fashions LP.

B. Slats: Aluminum; 2 inches wide; .008 inch minimum thickness; elliptical crown approximately 3/16 inch high; rounded corners. Slats shall be formed to concave/convex shape.

C. Head Rails and Bottom Rails: Steel, 0.022 +/- .003 inch thick; underside of bottom rail shall be flat with no outside clips, tape holders, end caps or other fittings which create light gaps at sill. Molded plastic end pieces, tape and cord holders shall be provided and located inside or on top of bottom rail. Provide light seal at underside of headrail.

D. Tapes: Manufacturer's standard A-V tapes, vinyl, 1-1/2 inches wide, with ladders uniformly spaced every 46 inches. Tapes shall be not more than 34 inches on centers, and shall be not less than 4-1/2 inches nor more than 7-1/2 inches from slat ends.

E. Color: Visible parts shall be of color as selected by the Architect from manufacturer's standard color selection.

F. Finish: Metal parts shall be furnished with factory-applied baked-on enamel or plastic finish.

G. Tilt Controls: Shall consist of enclosed worms and gear tilting mechanisms, which prevent slat-drift from selected angle.

H. Bottom Rails: Shall be provided with color-compatible molded plastic end caps.

I. Cords: Braided of high-strength synthetic fibers, and with cores to provide minimum stretch, maximum strength, abrasion resistance and flexibility. Cord shall be as a minimum 1.8 mm, and shall meet or exceed Commercial Item Specification 1029.86.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that openings are ready to receive Work.

B. Ensure that structural blocking and supports are installed and suitable for fastening and support of Work.

3.02 INSTALLATION

A. Install blinds as detailed in locations indicated. Furnish and install necessary parts and perform adjustments required to provide a complete, rigid and properly operating installation. Corners and surfaces shall be free from burrs and sharp edges.

B. Length of blind shall be at least 1-3/8 inches longer than height of window opening.

C. Unless otherwise indicated, blinds shall be top-suspended, installed singly over each sash and between jambs or mullions, heads set flush with wall or trim, and shall not interfere with operation of sash or sash hardware. Where recessed

installation is not indicated, blinds shall be installed over the casing, overlapping the casing not less than 1-3/8 inches at sill, 1-3/4 inches at jambs and one inch at top.

D. Brackets shall securely fasten headrails in place and shall provide for easy removal of headrails. Blinds shall be securely fastened with sheet metal screws through back into headrails.

E. Brackets shall be fastened with galvanized or cadmium-plated pan-head all-purpose screws oval-head wood screws, toggle bolts or other fasteners as required.

F. Upon completion of installation, test and adjust blinds and operating hardware to verify proper operation.

3.03 INSTALLATION TOLERANCES

A. Maximum Variation of Gap at Perimeter: 1/4 inch.

B. Maximum Offset from Level: 1/8 inch.

3.04 ADJUSTMENT AND CLEANUP

A. Adjust for smooth operation.

B. Before Substantial Completion, clean the blinds, including tapes, cords and tassels, in accordance with manufacturer's recommendations.

C. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 14 21 00

ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Electric Traction Elevators.

B. Products Supplied But Not Installed Under this Section:
1. Hoist Beam
2. Pit Ladder
3. Inserts mounted in block walls for rail attachments

C. Work Supplied Under Other Sections:
1. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door.
2. Hoistway ventilation shall be in accordance with local and national building code requirements.
3. Guide Rail Support shall be structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
4. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
5. Lifeline attachments capable of withstanding 5000 lb load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of 2 at the top, front of each hoistway.
6. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
7. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.
8. Access Doors: As required for access to governor. Access door shall be self-closing, self-locking if necessary and operable from the inside without a key.

D. Related sections:
1. Section 015000 - Temporary Facilities and Controls
2. Section 033000 - Cast-in-Place Concrete:
3. Section 042000 - Unit Masonry
4. Section 055000 - Metal Fabrications
5. Section 071600 - Cementitious Waterproofing
6. Section 230000 - Heating, Ventilating, and Air Conditioning
7. Section 260000 - Electrical
8. Section 263000 - Electric Power Generating and Storing Equipment
9. Section 273000 - Voice Communications
10. Section 283100 - Fire Detection and Alarm

11. Section 310000 - Earthwork

E. Industry and government standards:
1. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
2. ADAAG - Accessibility Guidelines for Buildings and Facilities
3. ANSI/NFPA 70, National Electrical Code
4. ANSI/NFPA 80, Standard for Fire Doors and Fire Windows
5. ASME/ANSI A17.1, Safety Code for Elevators and Escalators.

1.02 DESCRIPTION OF ELEVATOR

A. Elevator Equipment: KONE EcoSpace™ gearless traction elevator

B. Equipment Control: KCM831

C. Drive: Regenerative

D. Quantity of Elevators: 1

E. Landings: 2

F. Openings: 2 Front Openings, 0 Back Openings

G. Travel: 16'-0"

H. Rated Capacity: 3500 lbs (1588 kg)

I. Rated Speed: 150 fpm

J. Clear Inside Dimensions (W x D): 6'-8" x 5'-6 3/16"

K. Cab Height: 8'

L. Clear height under suspended ceiling: 7'-7"

M. Entrance Width & Type: & Right Opening

N. Entrance Height: 7'

O. Main Power Supply: 208 Volts + 5%, three-phase

P. Operation: Simplex

Q. Machine Location: Inside the hoistway mounted on car guide rail

R. Control Space Location: Adjacent Room

S. Elevator Equipment shall conform to the requirements of seismic zone: Seismic

T. Maintenance Service Period: 12 Months

1.03 PERFORMANCE REQUIREMENTS

A. Car Performance
1. Car Speed ± 5% of contract speed under any loading condition or direction of travel.
2. Car Capacity: Safely lower, stop and hold (per code) up to 125% of rated load.

B. System Performance
1. Vertical Vibration (maximum): 25 mg
2. Horizontal Vibration (maximum): 25 mg
3. Jerk Rate (maximum): 1.3 ft/sec3
4. Acceleration (maximum) 1.3 ft/sec2
5. In Car Noise: = 55 dB(A)
6. Leveling Accuracy: ±0.2 inches
7. Starts per hour (maximum): 120

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product literature for each proposed system.
1. Cab design, dimensions and layout.
2. Layout, finishes, and accessories and available options.
3. Controls, signals and operating system.
4. Color selection charts for cab and entrances.

B. Shop Drawings:
1. Clearances and travel of car.
2. Clear inside hoistway and pit dimensions.
3. Location and layout of equipment and signals.
4. Car, guide rails, buffers and other components in hoistway.
5. Maximum rail bracket spacing.
6. Maximum loads imposed on building structure.
7. Hoist beam requirements.
8. Location and sizes of access doors.
9. Location and details of hoistway door and frames.
10. Electrical characteristics and connection requirements.

C. Operation and maintenance data:
1. Provide manufacturer's standard maintenance and operation manual.

D. Diagnostic Tools
1. Prior to seeking final acceptance for the completed project as specified by the Contract Documents, the Elevator Contractor shall deliver to the Owner any specialized tool(s)

that may be required to perform diagnostic evaluations, adjustments, and/or parametric software changes and/or test and inspections on any piece of control or monitoring equipment installed. This shall include any specialized tool(s) required for monitoring, inspection and/or maintenance where the means of suspension other than conventional wire ropes are furnished and installed by the Elevator Contractor. Any and all such tool(s) shall become property of the Owner. Any diagnostic tool provided to the Owner by the Elevator Contractor shall be configured to perform all levels of diagnostics, systems adjustment and parametric software changes which are available to the Elevator Contractor. In those cases where diagnostic tools provided to the Owner require periodic recalibration/or re-initiation, the Elevator Contractor shall perform such tasks at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the competed project During those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation, or repair, the Elevator Contractor shall provide a temporary replacement for the tool at no additional cost to the Owner. The Elevator Contractor shall deliver to the Owner, printed instructions for the proper use of any tool that may be necessary to perform diagnostic evaluations, system adjustment, and/or parametric software changes on any unit of microprocessor-based elevator control equipment and means of suspension other than standard elevator steel cables furnished and install by the Elevator Contractor. Accompanying the printed instructions shall be any and all access codes, password, or other proprietary information that is necessary to interface with the microprocessor-control equipment.

1.05 QUALITY ASSURANCE

A. Manufacturer: Minimum of fifteen years experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.

B. Installer: The equipment manufacturer shall install the elevator.

C. Inspection and Testing: In accordance with requirements of local jurisdiction, obtain required permits, inspections and tests.

1.06 DELIVERY, STORAGE AND HANDLING

A. If the construction site is not prepared to receive the elevator equipment at the agreed ship date, the General Contractor shall be responsible to provide a safe, dry, and easily accessible storage area on or off the premises. Additional lablor costs for double handling will be the responsibility of the general contractor.

B. Delivered elevator materials shall be stored in a protected environment in accordance with manufacturer recommendations. A minimum storage area of 10 feet by 20 feet is required adjacent to the hoistway.

1.07 WARRANTY

A. Provide manufacturer warranty for a period of one year. The warranty period is to begin upon Substantial Completion of the Contract. Warranty covers defects in materials and workmanship. Damage due to ordinary use, vandalism, improper or insufficient maintenance, misuse, or neglect do not constitute defective material or workmanship.

1.08 MAINTENANCE SERVICE

A. The elevator manufacturer shall provide maintenance service consisting of regular examinations and adjustments of the elevator equipment for a period of 12 Months after date of substantial completion. Replacement parts shall be produced by the original equipment manufacturer.

B. Maintenance service be performed during regular working hours of regular working days and shall include regular time call back service.

C. Maintenance service shall not include adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Provide AC gearless machine room-less elevator systems subject to compliance with the design and performance requirements of this specification. Elevator manufacturers may include but are not limited to one of the following:
   1. Basis of Design: EcoSpace™ traction elevators by KONE, Inc. (www.kone.com).
   2. Other acceptable machine room-less products: manufacturer with minimum 15 years experience in manufacturing, installing, and servicing elevators of the type required for the project.

2.02 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE

A. Controller: Provide microcomputer based control system to perform all of the functions.
   1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
   2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
   3. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
   4. Variable field parameters and adjustments shall be contained in a non-volatile memory module.

B. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high

starting torque with low starting current. The drive will be set up for regeneration of AC power back into the building grid.

C. Control Space: Locate controller{s} in a room adjacent to the hoistway at the top landing on the machine side of the elevator.

2.03 EQUIPMENT: HOISTWAY COMPONENTS

A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.

B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.

C. Buffers, Car and Counterweight: Polyurethane buffer.

D. Hoistway Operating Devices:
   1. Emergency stop switch in the pit
   2. Terminal stopping switches.
   3. Emergency stop switch on the machine

E. Positioning System: System consisting of magnets and proximity switches.

F. Guide Rails and Attachments: Steel rails with brackets and fasteners.

2.04 EQUIPMENT: HOISTWAY ENTRANCES

A. Hoistway Entrances
   1. Sills: extruded.
   2. Doors: Hollow metal construction with vertical internal channel reinforcements.
   3. Fire Rating: Entrance and doors shall be UL fire-rated for 1-1/2 hour.
   4. Entrance Finish: Brushed Stainless Steel.
   5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

2.05 EQUIPMENT: CAR COMPONENTS

A. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.

B. Platform: Platform shall be all steel construction.

C. Car Guides: Provide guide-shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.

D. Steel Cab
   1. Car Wall Finish: Brushed stainless steel.
   2. Car Front Finish: Brushed stainless steel.
   3. Car Door Finish: Brushed stainless steel.
   4. Ceiling:
      a. Standard Translucent Panels - LF-1: Polygal Translucent three panel suspended ceiling with T-5 Fluorescent lighting and Brushed Aluminum frame.
   5. Handrail:
      a. Round tube brushed aluminum - 1.5 in.. Rails to be located on Back Wall of car enclosure.
   6. Flooring: By others. (Not to exceed 2sqft & 1/2" finished depth.)
   7. Threshold: Aluminum
   8. Protective pad hooks and quilted fire retardant protective pads: Pad to be hung from suspended ceiling

E. Emergency Car Signals
   1. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.
   2. Emergency Car Lighting: Provide emergency power unit employing a 12-volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
   3. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

F. Ventilation: No fan.

2.06 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: Provide car operating panel with all push buttons, key switches, and message indicators for elevator operation.
   1. Full height car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have amber illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be amber 7 Segment. All texts, when illuminated, shall be amber. The full height car operating panel shall have a polycarbonate face plate that is shatterproof and impact resistant in a color and pattern per manufacturers standard selection.
   2. Additional features of car operating panel shall include:
      a. Car Position Indicator within operating panel (amber).
      b. Elevator Data Plate marked with elevator capacity and car number on car top.
      c. Help buttons with raised markings.
      d. In car stop switch per local code.
      e. Firefighter's hat.
      f. Firefighter's Phase II Key-switch.

g. Call Cancel Button.
h. Pre-programmed integrated ADA phone (complete description of krms features included as standard)
i. Help Button/Communicator. Activation of help button will initiate two-way communication between car and a location inside the building, switching over to alternate location if call is unanswered, where personnel are available to take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
j. Firefighter's Phase II emergency in-car operating instructions.

B. Hall Fixtures: Wall mounted hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Wall mounted hall fixtures shall have a polycarbonate face plate that is shatterproof and impact resistant in a color per manufacturers standard selection.
1. Hall fixtures shall feature round, mechanical, illuminated buttons in raised fixture housings. Hall fixtures shall correspond to options available from that landing. Buttons shall be flat flush in vertically mounted fixture. Hall fixtures should not be jamb-mounted. Hall lanterns shall feature amber illumination.

C. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound. The chime will sound once for up and twice for down.

2.07 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER

A. Elevator Operation
1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
2. Zoned Car Parking.
3. Relative System Response Dispatching.

B. Standard Operating Features to include:
1. Full Collective Operation
2. Fan and Light Control.
3. Load Weighing Bypass.
4. Ascending Car Uncontrolled Movement Protection
5. Top of Car Inspection Station.

C. Additional Operating Features to include:
1. Emergency Battery Power Supply
When the main line power is lost for longer than 5 seconds the emergency battery power supply provides power automatically to the elevator controller. The elevator will rise or lower to the first available landing, open the doors, and shut down. The elevator will return to service upon the return of normal main line power. An auxiliary contact

on the main line disconnect and shunt trip breaker (if used) will be provided by others.

D. Elevator Control System for Inspections and Emergency
   1. Provide devices within controller to run the elevator in inspection operation.
   2. Provide devices on car top to run the elevator in inspection operation.
   3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
   4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
   5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
   6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
   7. Provide the means for the control to reset elevator earthquake operation.

2.08 EQUIPMENT: DOOR OPERATOR AND CONTROL

A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.

B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.

C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.

D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

PART 3 EXECUTION

3.01 EXAMINATION

A. Field measure and examine substrates, supports, and other conditions under which elevator work is to be performed.

B. Do not proceed with work until unsatisfactory conditions are corrected.

C. Prior to start of Work, verify hoistway is in accordance with shop drawings. Dimensional tolerance of hoistway from shop drawings: -0 inches +2 inches. Do not begin work of this section until dimensions are within tolerances.

D. Prior to start of Work, verify projections greater then 2 inches (4 inches if ASME A17.1/CSA B44 2000 applies) must be beveled not less then 75 degrees from horizontal.

E. Prior to start of Work, verify landings have been prepared for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.

F. Prior to start of Work, verify elevator pit has been constructed in accordance with requirements, is dry and reinforced to sustain vertical forces, as indicated in approved submittal. Verify that sumps or sump pumps located within pit will not interfere with installed elevator equipment.

G. Prior to start of Work, verify control space has been constructed in accordance with requirements, with access coordinated with elevator shop drawings, including Sleeves and penetrations.

H. Verify installation of GFCI protected 20-amp in pit and adjacent to each signal control cabinet in control space.

3.02 PREPARATION

A. Coordinate installation of anchors, bearing plates, brackets and other related accessories.

3.03 INSTALLATION

A. Install equipment, guides, controls, car and accessories in accordance with manufacturer installation methods and recommended practices.

B. Properly locate guide rails and related supports at locations in accordance with manufacturer's recommendations and approved shop drawings. Anchor to building structure using isolation system to minimize transmission of vibration to structure.

C. All hoistway frames shall be securely fastened to fixing angles mounted in the hoistway. Coordinate installation of sills and frames with other trades.

D. Lubricate operating system components in accordance with manufacturer recommendations.

E. Perform final adjustments, and necessary service prior to substantial completion.

3.04 CONSTRUCTION

A. Interface with Other Work:
   1. Guide rail brackets attached to steel shall be installed prior to application of fireproofing.
   2. Coordinate construction of entrance walls with installation of door frames and sills. Maintain front wall opening until elevator equipment has been installed.
      a. Ensure adequate support for entrance attachment points at all landings.
      b. Coordinate wall openings for hall push buttons, signal fixtures and sleeves. Each elevator requires sleeves within the hoistway wall.
      c. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.
      d. Coordinate interface of elevators and fire alarm system.
      e. Coordinate interface of dedicated telephone line.

3.05 TESTING AND INSPECTIONS

A. Perform recommended and required testing in accordance with authority having jurisdiction.

B. Obtain required permits and provide originals to Owner's Representative.

3.06 DEMONSTRATION

A. Prior to substantial completion, instruct Owner's Representative on the proper function and required daily maintenance of elevators. Instruct personnel on emergency procedures.

END OF SECTION

SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1) Submittal scheduling 01 32 00

2) Submittal Procedures 01 33 00

3) Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4) Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5) Drawings and Specifications

The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.

2. Sleeves.

3. Escutcheons.

4. Grout.

5. Painting and finishing.

6. Supports and anchorages.

1.03 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, 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 chases.

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. The following are industry abbreviations for rubber materials

1. EPDM: Ethylene-propylene-diene terpolymer rubber.

2. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

A. Product Data: For the following:

1. Mechanical sleeve seals.

2. Escutcheons.

B. Welding certificates.

1.05 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel".

B. 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 B31 Series, "Code for Pressure Piping".

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.07 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames".

PART 2 - PRODUCTS

2.01 ORIGIN OF PRODUCTS

A. Automatic Fire Suppression System including all piping and appurtenances, shall be manufactured in the USA, unless noted otherwise.

2.02 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for 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, the manufacturers specified.

2.03 PIPE, TUBE, AND FITTINGS

A. Refer to Division 21 13 13 Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.04 JOINING MATERIALS

A. Refer to Division 21 13 13 Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.05 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers

a. Advance Products & Systems, Inc.

b. Calpico, Inc.

c. Metraflex Co.

d. Pipeline Seal and Insulator, Inc.

e. Approved Equal.

2. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

3. Pressure Plates: Stainless steel. Include two for each sealing element.

4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.06 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

B. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. 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.

2.07 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. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated, rough brass, or matte.

C. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge set screw.

2.08 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements.

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, 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 according to the following:

1. New Piping

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

    b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.

    c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

    d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

    e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.

    f. Bare Piping in Equipment Rooms: One-piece, cast-brass type.

g. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials

a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

P. 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.

Q. 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.

R. 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 07 Section "Penetration Firestopping" for materials.

S. Verify final equipment locations for roughing-in.

T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.02 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.03 PAINTING

A. Painting of fire-suppression systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting".

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor fire-suppression 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.

3.06 GROUTING

A. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

SECTION 21 13 13

WET PIPE SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.
"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications

The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. Section Includes

1. Pipes, fittings, and specialties.

2. Fire-protection valves.

3. Sprinklers.

4. Alarm devices.

5. Pressure gages.

B. Related Sections

1. Division 33 Section "Water Utilities".

2. Division 28 Section "Fire Detection and Alarm".

1.03 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

B. Underground Service-Entrance Piping: Underground service piping below the building.

1.04 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device.

B. System to provide coverage for all buildings.

C. Provide hydraulically designed system to meet the occupancy requirements outlined by the California Building Code, California Fire Code and NFPA 13.

D. Interface system with building control system and the building fire and smoke alarm system.

E. Provide and install control valves, check valves, flow switches, tamper devices, local alarms and inspector test valves.

F. Provide personnel and material to perform all acceptance tests and to assist in inspections.

1.05 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.06 SUBMITTALS

A. Product Data: For the following:

1. Piping materials, including dielectric fittings, flexible connections, and sprinkler specialty fittings.

2. Pipe hangers and supports including seismic restraints.

3. Valves, including listed fire-protection valves and specialty valves and trim.

4. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.

5. Water flow switch and tamper switch, including electrical data.

6. Alarm devices, including electrical data.

7. Submit performance ratings, rough-in details, weights, support requirements, and piping connections

B. Shop Drawings:

1. Upon completion of the work, the Contractor shall provide reproducible As-Built Drawings to the Architect. Final approvals are subject to receipt of acceptable As-Built Drawings.

C. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved

1. Domestic water piping.

2. Items penetrating finished ceiling include the following:

a. Lighting fixtures.

b. Air outlets and inlets.

D. Qualification Data: For qualified Installer.

E. Submittals having any content which is incomplete or unclear will be returned without review or approval.

F. Discharge patterns and application data shall be included in submittals for sidewall, water curtain, and similar special purpose sprinklers.

G. Operating Instructions: Provide instruction charts describing operation and proper maintenance of system equipment.

H. Welding certificates.

I. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

J. Field quality-control reports.

K. Samples: Submit two of each style of sprinkler specified.

L. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.07 QUALITY ASSURANCE

A. Installer Qualifications

a. Installing Contractor shall have a C-16 license.

B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."

1.08 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. The Contractor shall coordinate work specified in other Divisions to avoid any interference with the effectiveness of the fire protection system. Shop drawings shall include elevations of equipment and piping specified in other Divisions to assure coordination. The fire protection system shall be coordinated with work specified in other Divisions to assure that conflicts will not arise with structural, mechanical, electrical or architectural features of the building. Any changes required by field coordination, even after the approved shop drawings, shall be provided and installed at no cost to the Owner.

C. The Contractor shall coordinate the fire sprinkler and alarm work to ensure full awareness of the location of all control valves, flow switches, tamper switches, and alarm and signal switches

1.09 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.01 ORIGIN OF PRODUCTS

A. Automatic Fire Suppression System including all piping and appurtenances, shall be manufactured in the USA, unless noted otherwise.

2.02 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell end and plain end.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern.

2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron gland, rubber gasket, and steel bolts and nuts.

2.03 STEEL PIPE AND FITTINGS

A. Schedule 40, Black-Steel Pipe: ASTM A 53/A 53M. Pipe ends may be factory or field formed to match joining method.

B. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, Schedule 40, seamless steel pipe with threaded ends.

C. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

D. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

E. Grooved-Joint, Steel-Pipe Appurtenances

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Victaulic Company.

b. Anvil International Inc.

c. Approved Equal.

2. Pressure Rating: 250 psig minimum.

3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

F. Steel Pressure-Seal Fittings: UL 213, FM-approved, 175-psig pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

1. Manufacturers: Subject to compliance with requirements.

a. Victaulic Company.

b. Anvil International Inc.

c. Approved Equal.

2.04 SEISMIC EXPANSION JOINTS

A. All sprinkler pipe passing through or crossing building seismic joints, shall contain a flexible expansion loop, designed for seismic movement. Flexible loops shall impart no thrust loads to building structure. Loops shall be located at, or near, the building seismic joint. Seismic bracing shall not pass through building seismic joint and shall not connect or tie together different sides or parts of building structure. Flexible loops shall be capable of +-4" movement in the ±X, ±Y, ±Z planes. Flexible loops may be installed to accommodate thermal expansion, seismic movement, and building settlement. Unless specified otherwise by system design engineer or governing codes, all flexible loop connections to sprinkler piping shall be installed, inspected, and tested in accordance with current NFPA-13 standards.

B. Flexible loops shall consist of two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return. Loops shall include a factory supplied, center support nut located at the bottom of the 180 degree return, and a drain/air release plug. Materials of construction and end fitting type shall be consistent with pipe material and equipment/pipe connection. It shall be UL listed for Fire Sprinkler application.

C. Manufacturer:

1. Metraflex.

2. Approved Equal.

2.05 LISTED FIRE-PROTECTION VALVES

A. General Requirements

1. Valves shall be UL listed or FM approved.

2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.

B. Ball Valves

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

   a. Anvil International, Inc.

   b. Victaulic Company.

   c. NIBCO.

   d. Approved Equal.

2. Standard: UL 1091 except with ball instead of disc.

3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.

4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.

5. Valves NPS 3: Ductile-iron body with grooved ends.

C. Check Valves

1. Manufacturers: Subject to compliance with requirements, provide or comparable product by one of the following:

   a. Anvil International, Inc.

   b. Victaulic Company.

   c. NIBCO.

   d. Approved Equal.

2. Standard: UL 312.

3. Pressure Rating: 250 psig minimum.

4. Type: Swing check.

5. Body Material: Cast iron.

6. End Connections: Flanged or grooved.

D. OS & Y Gate Valves

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

   a. Kennedy

   b. NIBCO INC.

   c. Tyco Fire & Building Products LP.

   d. Victaulic Company.

   e. Approved Equal.

2. Standard: UL 262.

3. Pressure Rating: 175 psig minimum.

4. Valves NPS 2-1/2" and Larger.

   a. Valve Type: OS&Y.

   b. Body Material: Cast or Ductile Iron.

   c. End Connections: Flanged.

5. Valve Operation: Integral electrical, 115-V AC, prewired, single-circuit, supervisory switch indicating device.

E. Indicating-Type Butterfly Valves

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

   a. Kennedy

   b. NIBCO INC.

   c. Tyco Fire & Building Products LP.

   d. Victaulic Company.

   e. Approved Equal.

2. Standard: UL 1091.

3. Pressure Rating: 175 psig minimum.

4. Valves NPS 2 and Smaller

   a. Valve Type: Butterfly.

   b. Body Material: Bronze.

   c. End Connections: Threaded.

5. Valves NPS 2-1/2 and Larger

   a. Valve Type: Butterfly.

   b. Body Material: Cast or ductile iron.

   c. End Connections: Flanged, grooved, or wafer.

6. Valve Operation: Integral [electrical, 115-V AC, prewired, single-circuit, supervisory switch indicating device.

2.06 UNLISTED GENERAL-DUTY VALVES

A. Ball Valves NPS 2 and smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig (4140-kPa) minimum CWP rating, blowout-proof stem, and threaded ends.

B. Check Valves NPS 2 and smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.

C. Gate Valves NPS 2 and smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, solid wedge, and threaded ends.

D. Globe Valves NPS 2 and smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.

2.07 SPECIALTY VALVES

A. Riser Alarm Valve Assembly:

The riser check valve shall be UL Listed and Factory Mutual Approved. The riser check valve shall be equipped with a removable cover assembly. The riser check valve shall be listed for installation in the vertical position. The riser check valve shall be equipped with gauge connections on the system sides and supply side of the valve clapper. The riser check valve shall be equipped with a main drain outlet in the body of the valve above the rubber faced clapper assembly. The riser check valve trim piping to be externally galvanized. Maximum water working pressure to 250 PSI. The riser check valve manufacturer to be The Viking Corporation. The check valve to be a Viking Model J-1 complete with J-1 Vertical Trim .

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

a. Viking Corp.

b. Grinnell Fire Protection.

c. Approved Equal.

2.08 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water Motor Operated Alarm:

1. Manufacturers: Subject to compliance with requirements, provide products by pone of the following;

a. Viking Corp.

b. Tyco Fire & Building Products LP.

c. Victaulic Company.

d. Approved Equal.

2. Standard: UL 753.

3. Type: Mechanically operated, with Pelton wheel.

4. Alarm Gong: Cast aluminum with red-enamel factory finish.

5. Size: 10-inch diameter.

6. Components: Shaft length, bearings, and sleeve to suit wall construction.

7. Inlet: NPS 3/4.

8. Outlet: NPS 1 drain connection.

C. Water-Flow Indicator: UL 346, electrical-supervision, paddle-operated-type, water-flow detector with 250-psig pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed. If drilling of the system riser is necessary to mount flow switch, the drilled out disc shall be retrieved and attached to the mounting u-bolt of the flow switch. The vane type flow switch shall be equipped with an adjustable delay of audible alarm initiation. Adjustment range shall be from 0 to 120 seconds.

1. Manufacturers: Subject to compliance with requirements, provide products by pone of the following;

a. Grinnell Fire Protection.

b. Potter Electric Signal Company.

c. Viking Corp.

d. Approved Equal.

D. Valve Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position.

1. Manufacturers: Subject to compliance with requirements, provide products by pone of the following;

a. McWane, Inc.; Kennedy Valve Div.

b. Potter Electric Signal Company.

c. System Sensor.

d. Approved Equal.

2.09 PRESSURE GAUGES

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

a. AMETEK; U.S. Gauge Division

b. Ashcroft, Inc.

c. Brecco Corporation.

d. WIKA Instrument Corporation.

e. Approved Equal.

2.10 SPRINKLER SPECIALTY PIPE FITTINGS

A. Sprinkler Inspector's Test Fittings

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

a. Tyco Fire & Building Products LP.

b. Victaulic Company.

c. Viking Corporation.

d. Approved Equal.

2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide", published by FM Global, listing.

3. Pressure Rating: 175 psig minimum.

4. Body Material: Cast- or ductile-iron housing with sight glass.

5. Size: Same as connected piping.

6. Inlet and Outlet: Threaded.

2.11 SPRINKLERS

A. Manufacturers: Basis of design is Viking Corporation or provide comparable product by one of the following manufacturers:

1. Reliable Automatic Sprinkler Co., Inc.

2. Grinnell Fire Protection.

3. Victaulic Company.

4. Approved Equal

B. General Requirements

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide", published by FM Global, listing.

2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element

1. Nonresidential Applications: UL 199

2. Characteristics: Quick Response with nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler types, features and options as follows.

1. Quick Response Sprinklers:

a. Concealed ceiling sprinklers including cover plate: Viking SIN VK300

b. Pendent on drop sprinklers: Viking SIN VK302

c. Recessed sidewall sprinklers including escutcheon plate: Viking SIN VK305

d. Upright sprinklers: Viking SIN VK 462

e. Upright large orifice sprinklers: Viking SIN VK 350.

E. Sprinkler Finishes

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.

2. Upright and Pendent on drop sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

F. Sprinkler Guards

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

a. Reliable Automatic Sprinkler Co., Inc.

b. Tyco Fire & Building Products LP.

c. Victaulic Company.

d. Viking Corporation.

e. Approved Equal.

2. Standard: UL 199.

3. Type: Wire cage with fastening device for attaching to sprinkler.

2.12 PRESSURE GAGES

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

1. AMETEK; U.S. Gauge Division.

2. Ashcroft, Inc.

3. Brecco Corporation.

4. WIKA Instrument Corporation.

5. Approved Equal.

B. Standard: UL 393.

C. Dial Size: to 4-inch diameter.

D. Pressure Gage Range: 0 to 300 psig.

E. Water System Piping Gage: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.02 EXAMINATION

A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.

B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 PIPING APPLICATIONS, GENERAL

A. Shop weld pipe joints where welded piping is indicated.

B. Do not use welded joints for galvanized-steel pipe.

C. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

D. Underground Service-Entrance Piping: Ductile-iron, push-on-joint pipe and fittings and restrained joints. Include corrosion-protective encasement.

3.04 SPRINKLER SYSTEM PIPING APPLICATIONS

A. Standard-Pressure, Wet-Pipe Sprinkler System, 175-psig Maximum Working Pressure:

1. NPS 1-1/2 and smaller: Threaded-end, black, Schedule 40 steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.

2. NPS 2: Threaded-end, black, Schedule 40 steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.

3. NPS 2-1/2 to NPS 3: Threaded-end, black, Schedule 40 steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.

4. NPS 2-1/2 to NPS 3: Plain-end, black, Schedule 40 steel pipe; steel welding fittings; and welded joints.

5. NPS 4: Threaded-end, black, black or galvanized, Schedule 40 steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.

6. NPS 4: Plain-end, black, Schedule 40 steel pipe; steel welding fittings; and welded joints.

3.05 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Listed Fire-Protection Valves: UL listed and FMG approved for applications where required by NFPA 13.

a. Shutoff Duty: Use ball, butterfly, or gate valves.

2. Unlisted General-Duty Valves: For applications where UL-listed and FMG-approved valves are not required by NFPA 13.

a. Shutoff Duty: Use ball, butterfly, or gate valves.

b. Throttling Duty: Use ball or globe valves.

3.06 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install alarm devices in piping systems.

K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

M. Fill sprinkler system piping with water.

3.07 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows

1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

M. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.08 SERVICE-ENTRANCE PIPING

A. Connect fire-suppression piping to water-service piping of size and in location indicated for service entrance to building. Refer to Division 22 Section "Facility Water Distribution Piping" for exterior piping.

B. Install shutoff valve, pressure gage, drain, and other accessories indicated at connection to water-service piping.

3.09 WATER-SUPPLY CONNECTION

A. Connect water-supply piping to fire-suppression piping. Above ground piping to be flushed and tested prior to connection to underground service piping.

3.10 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

3.11 SPRINKLER APPLICATIONS

A. Rooms without Ceilings: Upright Sprinklers or Pendent sprinklers, as indicated.

B. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers, as indicated.

C. Wall Mounting: Sidewall sprinklers.

D. Sprinkler Finishes:

1. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

2. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.

3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.

3.12 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

3.13 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Specialty Valves:

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

3.14 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Connect water-supply piping to fire-suppression piping. Refer to Division 22 Section "Domestic Water Piping Specialties" for backflow preventers.

D. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.

E. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.

F. Electrical Connections: Power wiring is specified in Division 26.

G. Connect alarm devices to fire alarm.

H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems".

I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

J. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.15 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".

3.16 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.

4. Energize circuits to electrical equipment and devices.

5. Coordinate with fire-alarm tests. Operate as required.

6. Verify that equipment hose threads are same as local fire-department equipment.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.17 CLEANING AND PROTECTION

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

C. Protect sprinklers from damage until substantial completion.

3.18 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.19 DELIVERY, STORAGE, AND HANDLING

A. Refer to Section for Product storage and handling requirements.

B. Store products in shipping containers until installation.

C. Furnish piping with temporary inlet and outlet caps until installation.

END OF SECTION

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications

The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Equipment installation requirements common to equipment sections.
8. Painting and finishing.
9. Supports and anchorages.

1.03 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, 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 chases.

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. The following are industry abbreviations for plastic materials:

1. PE: Polyethylene plastic.
2. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.

2. Dielectric fittings.

3. Mechanical sleeve seals.

4. Escutcheons.

B. Welding certificates.

1.05 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. 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 B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. 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.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.07 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. 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.

2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02 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 B1.20.1 for factory-threaded pipe and pipe fittings.

2.03 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. PVC Piping: ASTM D 2564. Include Primer according to ASTM F 656

2.04 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Manufacturers:

a. Cascade Waterworks Mfg. Co.

b. Dresser Industries, Inc.; DMD Div.

c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.

d. JCM Industries.

e. Smith-Blair, Inc.

f. Viking Johnson.

2. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.

3. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.

4. Aboveground Pressure Piping: Pipe fitting.

B. Plastic-to-Metal Transition Fittings: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers:

a. Eslon Thermoplastics.

C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers:

a. Thompson Plastics, Inc.

D. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

1. Manufacturers:

a. Calder

b. Cascade Waterworkd Mfg. Co.

c. Fernco, Inc.

d. Mission Rubber Company

2.05 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 deg F.

1. Manufacturers:

a. Capitol Manufacturing Co.

b. Central Plastics Company.

c. Eclipse, Inc.

d. Epco Sales, Inc.

e. Hart Industries, International, Inc.

f. Watts Industries, Inc.; Water Products Div.

g. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Manufacturers:

a. Capitol Manufacturing Co.

b. Central Plastics Company.

c. Epco Sales, Inc.

d. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Manufacturers:

a. Advance Products & Systems, Inc.

b. Calpico, Inc.

c. Central Plastics Company.

d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Calpico, Inc.

b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Perfection Corp.

b. Precision Plumbing Products, Inc.

c. Sioux Chief Manufacturing Co., Inc.

d. Victaulic Co. of America.

2.06 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

a. Advance Products & Systems, Inc.

b. Calpico, Inc.

c. Metraflex Co.

d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

3. Pressure Plates: Stainless steel. Include two for each sealing element.

4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.07 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 PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.08 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 set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Type: With spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

PART 3 - EXECUTION

3.01 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 according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.

c. Insulated Piping: One-piece, stamped-steel type with spring clips.

d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge and set screw.

f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.

g. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with exposed-rivet hinge and set screw.

h. Bare Piping in Equipment Rooms: One-piece, cast-brass type.

i. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips].

j. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

M. Sleeves are not required for core-drilled holes.

N. Permanent sleeves are not required for holes formed by removable PE sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation. For soundproof walls provide ¾-inch annular clear space. Use the following sleeve materials:

a. PVC Schedule 40 Pipe Sleeves: For foundation walls.

b. 24 Gauge Galvanized sheet metal assemblies with telescopic sleeves and square base plates: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

c. Walls and Floors: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

Q. 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.

R. 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.

S. 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 07 Section "Penetration Firestopping" for materials.

T. Verify final equipment locations for roughing-in.

U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.02 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 A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "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.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

3. PVC Nonpressure Piping: Join according to ASTM D 2855.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.

2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.03 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.

3.04 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not 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. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.05 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.06 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" 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.

3.07 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.

END OF SECTION

SECTION 22 05 19

METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 35 00

2. Submittal content and format 01 35 00

3. Substitutions 01 63 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment

ln addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications: The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. Section lncludes:

1. Thermometers.

2. Gages.

3. Test plugs.

B. Related Sections:

1. Division 22 Section "Facility Water Distribution Piping" for domestic and fire-protection water service meters outside the building.

2. Division 22 Section "Domestic Water Piping" for domestic and fire-protection water service meters inside the building.

3. Division 23 Section "Facility Natural-Gas Piping" for gas meters.

4. Division 33 Water Utility Metering.

1.03 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated; include performance curves.

B. Product Certificates: For each type of thermometer and gage, signed by product manufacturer.

PART 2 - PRODUCTS

2.01 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Trerice, H. O. Co.

2. Weiss Instruments, Inc.

3. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

C. Case: Chrome-plated brass, 7 inches long.

D. Tube: Red or blue reading, organic-liquid filled, with magnifying lens.

E. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.

F. Window: Glass or plastic.

G. Connector: Rigid, straight type.

H. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.

I. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.02 BIMETALLIC-ACTUATED DIAL THERMOMETERS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.

2. Ernst Gage Co.

3. Trerice, H. O. Co.

4. Weiss Instruments, Inc.

5. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

C. Description: Direct-mounting, bimetallic-actuated dial thermometers complying with ASME B40.3.

D. Case: Liquid-filled type, stainless steel with 3-inch diameter.

E. Element: Bimetal coil.

F. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.

G. Pointer: Red metal.

H. Window: Glass or plastic.

I. Ring: Stainless steel.

J. Connector: Rigid, bottom type.

K. Stem: Metal, for thermowell installation and of length to suit installation.

L. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.03 THERMOWELLS

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

B. Manufacturers: Same as manufacturer of thermometer being used.

C. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

2.04 PRESSURE GAGES

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.

2. Ernst Gage Co.

3. Trerice, H. O. Co.

4. Weiss Instruments, Inc.

5. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

C. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.

1. Case: Liquid-filled type, drawn steel or cast aluminum, 4-1/2-inch diameter.

2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.

3. Pressure Connection: Brass, NPS 1/4 (DN 8), bottom-outlet type unless back-outlet type is indicated.

4. Movement: Mechanical, with link to pressure element and connection to pointer.

5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.

6. Pointer: Red metal.

7. Window: Glass or plastic.

8. Ring: Stainless steel.

9. Accuracy: Grade A, plus or minus 1 percent of middle half scale.

10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.

11. Range for Fluids under Pressure: Two times operating pressure.

D. Pressure-Gage Fittings:

1. Valves: NPS 1/4 brass or stainless-steel needle type.

2. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

PART 3 - EXECUTION

3.01 THERMOMETER APPLICATIONS

A. Install liquid-in-glass bimetallic-actuated dial thermometers in the outlet of each domestic, hot-water storage tank.

B. Install liquid-filled-case-type, bimetallic-actuated dial thermometers at suction and discharge of each pump.

C. Provide the following temperature ranges for thermometers:

1. Domestic Hot Water: [30 to 180 deg F, with 2-degree scale divisions

3.02 GAGE APPLICATIONS

A. Install dry-case-type pressure gages for discharge of each pressure-reducing valve.

B. Install liquid-filled-case-type pressure gages at suction and discharge of each pump.

3.03 INSTALLATIONS

A. Install direct-mounting thermometers and adjust vertical and tilted positions.

B. Install remote-mounting dial thermometers on panel, with tubing connecting panel and thermometer bulb supported to prevent kinks. Use minimum tubing length.

C. Install thermowells with socket extending one-third of diameter of pipe and in vertical position in piping tees where thermometers are indicated.

D. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position.

E. Install remote-mounting pressure gages on panel.

F. Install needle-valve and snubber fitting in piping for each pressure gage.

G. Install test plugs in tees in piping.

H. Install permanent indicators on walls or brackets in accessible and readable positions.

I. Install connection fittings for attachment to portable indicators in accessible locations.

J. Install thermometers and gages adjacent to machines and equipment to allow service and maintenance for thermometers, gages, machines, and equipment.

K. Adjust faces of thermometers and gages to proper angle for best visibility.

END OF SECTION

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications: The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Bronze swing check valves.
3. Bronze gate valves.
4. Iron Gate valves.
5. Bronze globe valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.03 DEFINITIONS

A. C.W.P: Cold Working Pressure

B. NRS: Nonrising stem.

C. OS&Y: Outside screw and yoke.

D. RS: Rising stem.

E. SWP: Steam working pressure.

1.04 SUBMITTALS

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

1.05 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.

2. Protect threads, flange faces, grooves, and weld ends.

3. Set gate, and globe valves closed to prevent rattling.

4. Set ball valves open to minimize exposure of functional surfaces.

5. Block checks valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.

2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

E. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.

2. Solder Joint: With sockets according to ASME B16.18.

3. Threaded: With threads according to ASME B1.20.1.

F. Valve Bypass and Drain Connections: MSS SP-45.

2.02 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

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

a. NIBCO INC.

b. Apollo

c. Hammond Valve.

d. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-110.

b. SWP Rating: 150 psig.

c. CWP Rating: 600 psig.

d. Body Design: Two piece.

e. Body Material: Bronze.

f. Ends: Threaded or Soldered.

g. Seats: PTFE or TFE.

h. Stem: Bronze.

i. Ball: Chrome-plated brass.

j. Port: Full.

2.03 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

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

a. Crane Co.; Crane Valve Group; Stockham Division.

b. Milwaukee Valve Company.

c. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 3.

b. CWP Rating: 200 psig.

c. Body Design: Horizontal flow.

d. Body Material: ASTM B 62, bronze.

e. Ends: Threaded.

f. Disc: Bronze.

B. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

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

a. Crane Co.; Crane Valve Group; Stockham Division.

b. Milwaukee Valve Company.

c. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 4.

b. CWP Rating: 200 psig.

c. Body Design: Horizontal flow.

d. Body Material: ASTM B 62, bronze.

e. Ends: Threaded.

f. Disc: PTFE or TFE.

2.04 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

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

a. Crane Co.; Crane Valve Group; Stockham Division.

b. Milwaukee Valve Company.

c. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 1.

b. CWP Rating: 200 psig.

c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.

d. Ends: Threaded or solder joint.

e. Stem: Bronze.

f. Disc: Solid wedge; bronze.

g. Packing: Asbestos free.

h. Handwheel: Malleable iron or bronze.

2.05 IRON GATE VALVES

A. Class 125, NRS, Iron Gate Valves:

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

a. Crane Co.; Crane Valve Group; Stockham Division.

b. Milwaukee Valve Company.

c. NIBCO INC.

2. Description:

a. Standard: MSS SP-70, Type I.

b. CWP Rating: 200 psig.

c. Body Material: ASTM A 126, gray iron with bolted bonnet.

d. Ends: Flanged.

e. Trim: Bronze.

f. Disc: Solid wedge.

g. Packing and Gasket: Asbestos free.

2.06 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

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

a. Crane Co.; Crane Valve Group; Stockham Division.

b. Milwaukee Valve Company.

c. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 1.

b. CWP Rating: 200 psig.

c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.

d. Ends: Threaded or solder joint.

e. Stem and Disc: Bronze.

f. Packing: Asbestos free.

g. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for ball, gate and globe valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

2. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.

3.03 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, or gate valves.

2. Throttling Service: Globe or ball valves.

3. Pump-Discharge Check Valves:

a. NPS 2 and Smaller: Bronze swing check valves with bronze discs.

b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal or resilient-seat check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3. For Copper Tubing, NPS 5 and Larger: Flanged ends.

4. For Steel Piping, NPS 2 and Smaller: Threaded ends.

5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.05 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.

2. Class 125, Class 150, bronze disc.

3. Ball Valves: Two piece, full port,bronze trim.

4. Bronze Swing Check Valves: Class 150, bronze disc.

5. Bronze Gate Valves: Class 125, NRS.

6. Bronze Globe Valves: Class 125 bronze discs.

B. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.

2. Iron Ball Valves: Class 150.

3. Iron Swing Check Valves: Class 250, nonmetallic-to-metal seats.

4. Iron Gate Valves: Class 125, NRS.

5. Iron Globe Valves: Class 125.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following hangers and supports for plumbing system piping and equipment:

1. Steel pipe hangers and supports.

2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Equipment supports.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 21 Section "Water-Based Fire-Suppression Systems" for pipe hangers for fire-suppression piping.
3. Division 22 Section "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
4. Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.03 DEFINITIONS

A. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.04 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.05 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.
2. Thermal-hanger shield inserts.

B. Welding certificates.

1.06 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.01 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.

2.02 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. Hubbard Enterprices/HOLDRITE®

2. B-Line Systems, Inc.; a division of Cooper Industries.

3. ERICO/Michigan Hanger Co.

4. PHD Manufacturing, Inc.

5. Tolco Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.03 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

1. The total weight of piping and components upon each trapeze span shall not exceed the manufactures load rating. Load ratings must included a minimum 2 X safety factor.

a. Hubbard Enterprices/HOLDRITE EZ-Strut™ or owner approved equivalent.

2.04 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.

2. ERICO/Michigan Hanger Co.; ERISTRUT Div.

3. Tolco Inc.

4. Unistrut Corp.; Tyco International, Ltd.

C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.05 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Hubbard Enterprices/HOLDRITE®
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.

C. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.06 FASTENER SYSTEMS

A. Powder – Actuated Fasteners Shall Not Be Used

B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. Hubbard Enterprices/HOLDRITE®
b. B-Line Systems, Inc.; a division of Cooper Industries.
c. Hilti, Inc.
d. ITW Ramset/Red Head.
e. Powers Fasteners.

2.07 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.08 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Plenum Rated Pipe Clamps: ASTM E-84 25/50 plastic clamps from Hubbard Enterprises/HOLDRITE.

C. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.

2. Design Mix: 5000-psi, 28-day compressive strength.

D. Roof top supports: Roof top support application for hydronic piping, domestic hot and cold water piping, condensate piping and natural gas piping as manufactured by Cooper B-Line.

1. Description: UV resistant 100% recycled rubber base, channels, channel nuts, pipe straps/clamps, rollers and roller support; assembly shall be compatible with strut systems.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Support of pipe, tubing and equipment shall be accomplished by means of engineered products, specific to each application. Makeshift, field devised methods shall not be allowed.

F. Use padded hangers for piping that is subject to scratching.

G. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 .

2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.

3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.

4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

5. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.

H. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

3. For vertical mid-span support of piping 4" and under, use Hubbard Enterprises/HOLDRITE Stout Brakets™ with Hubbard Enterprises/HOLDRITE Stout Clamps or two-hole pipe clamps (MSS Type 26).

I. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

J. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.

3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

5. C-Clamps (MSS Type 23): For structural shapes.

6. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

7. Overhead pipe runs of 1" and less to utilize Hubbard Enterprises/HOLDRITE #125, #125-L or #121 Series brackets.

K. Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

L. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.

M. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

N. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

O. Use mechanical-expansion anchors instead of building attachments where required in concrete construction. Power-actuated fasteners are prohibited, unless approved in writing by the Architects and the Structural Engineer.

P. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.02 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers. For piping 2" and below, manufactured specialty products formed from pregalvanized commercial steel are to be used, such as the Hubbard Enterprises/HOLDRITE EZ-Strut.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

2. Field fabricates from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, 2'/2" and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

M. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

b. NPS 4: 12 inches long and 0.06 inch thick.

5. Insert Material: Length at least as long as protective shield.

6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

N. Roof top supports: Dura-Blok products as manufactured by Copper B-Line.

1. Support bases only.

2. Support base with 14 gauge B44 channel.

3. Support base with 12 gauge B12 channel.

4. Support base with 12 gauge B22 channel.

5. Dura-Blok bases shall be attached to roof with Henry 204 non-hardening, non-running plastic roof cement. No nail, screws and bolts shall be used to penetrate the finished roof.

3.03 EQUIPMENT SUPPORTS

A. Engineered, Factory-fabricated, galvanized steel supports are to be used when suspending equipment from overhead structures or when supporting equipment above the floor.

1. Suspended water heater installations shall include a drain pan with minimum 2-1/2" high sidewalls and a minimum ¾" drain connection.

2. Water heaters of 50 gallons or less, suspended from the structure above, shall be installed with an engineered and manufactured product like the Suspended Water Heater Platform with integral drain body from Hubbard Enterprises/HOLDRITE or Owner-approved equivalent.

3. Water heaters placed on a stand, to elevate them above the floor, shall be installed using a manufactured galvanized steel stand, engineered to meet the intended weight load. Use the QuickStand series from Hubbard Enterprises/HOLDRITE.

4. Water heaters installed in seismic zones shall be supported from the adjoining structure by the use of DSA approved safety restrain devises.

Use QuickStarp from Hubbard Enterprises/HOLDRITE or Owner-approved equivalent.

B. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

C. Grouting: Place grout under supports for equipment and make smooth bearing surface.

D. Provide lateral bracing, to prevent swaying, for equipment supports.

3.04 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.06 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 22 05 48

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following:

1. Isolation pads.

2. Isolation mounts.

3. Restrained elastomeric isolation mounts.

4. Pipe riser resilient supports.

5. Resilient pipe guides.

6. Restraining braces and cables.

1.03 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.04 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: A.

2. Assigned Seismic Use Group or Building Category as Defined in the IBC: I.

a. Component Importance Factor: 1.0.

b. Component Response Modification Factor: 1.5.

c. Component Amplification Factor: 1.0.

3. Design Spectral Response Acceleration at Short Periods 0.2 Second:

4. Design Spectral Response Acceleration at 1-Second Period:

1.05 SUBMITTALS

A. Product Data: For each product indicated.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including

analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer.

E. Field quality-control test reports.

1.06 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

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

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval by ICC-ES, or preapproved by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Kinetics Noise Control.
5. Mason Industries.

D. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant neoprene.

E. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

F. Restrained Mounts: All-directional mountings with seismic restraint.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

G. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.

2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

4. Minimum Additional Travel: 50 percent of the required deflection at rated load.

5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

H. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig and for equal resistance in all directions.

I. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of 1/2-inch thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.02 SEISMIC-RESTRAINT DEVICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.

2. Hilti, Inc.

3. Mason Industries.

4. TOLCO Incorporated; a brand of NIBCO INC.

D. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

E. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

F. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections.

G. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

I. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.02 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install seismic snubbers on plumbing equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.

2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inches.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127.

2. Space lateral supports a maximum of 40 feet and longitudinal supports a maximum of 80 feet.

3. Brace a change of direction longer than 12 feet.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES.

E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

G. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.

4. Set anchors to manufacturer's recommended torque, using a torque wrench.

5. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.03 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 22 Section "Domestic Water Piping" for piping flexible connections.

3.04 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.

2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.

3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.

4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.

5. Test to 90 percent of rated proof load of device.

6. Measure isolator restraint clearance.

7. Measure isolator deflection.

8. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.05 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of sprint isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. Section Includes:

1. Equipment labels.

2. Warning signs and labels.

3. Pipe labels.

4. Stencils.

5. Valve tags.

1.03 SUBMITTALS

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

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

4. Fasteners: Stainless-steel rivets or self-tapping screws.

5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

2. Letter Color: White.

3. Background Color: Black.

4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel rivets or self-tapping screws.

8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving,1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.03 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.04 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

2. Fasteners: Brass wire-link or beaded chain.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.03 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of [50 feet (15 m)] <Insert dimension> along each run. Reduce intervals to [25 feet (7.6 m)] <Insert dimension> in areas of congested piping and equipment.

7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Domestic Water Piping:

a. Background Color: Green.

b. Letter Color: Black.

2. Sanitary Waste and Storm Drainage Piping:

a. Background Color: Green.

b. Letter Color: White.

3.04 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; 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 subparagraphs:

1. Valve-Tag Size and Shape:

   a. Cold Water: 2 inches, round.

   b. Hot Water: 2 inches, round.

2. Valve-Tag Color:

   a. Cold Water: Green.

   b. Hot Water: Green.

3. Letter Color:

   a. Cold Water: White.

   b. Hot Water: White.

END OF SECTION

SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. Section Includes:

1. Insulation Materials:

   a. Flexible elastomeric.

   b. Mineral fiber.

2. Insulating cements.

3. Adhesives.

4. Mastics.

5. Sealants.

6. Factory-applied jackets.

7. Field-applied fabric-reinforcing mesh.

8. Field-applied jackets.

9. Tapes.

10. Securements.

11. Corner angles.

B. Related Sections include the following:

1. Division 21 Section "Fire-Suppression Systems Insulation."

2. Division 23 Section "HVAC Insulation."

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets both factory and field applied.

B. Field quality-control reports.

1.04 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following, but are not limited to, the following:

a. Aeroflex USA Inc.; Aerocel.

b. Armacell LLC; AP Armaflex.

c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

d. Or approved equal.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following, but are not limited to, the following]:

a. Johns Manville; Micro-Lok.

b. Knauf Insulation; 1000(Pipe Insulation.

c. Owens Corning; Fiberglas Pipe Insulation.

d. Or approved equal.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; CrimpWrap.

b. Johns Manville; MicroFlex.

c. Knauf Insulation; Pipe and Tank Insulation.

d. Owens Corning; Fiberglas Pipe and Tank Insulation.

e. Or approved equal.

2.02 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:

a. Insulco, Division of MFS, Inc.; SmoothKote.

b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.

c. Rock Wool Manufacturing Company; Dclta One Shot.

d. Or approved equal.

2.03 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to it and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Products, Division of ITW; CP-96.

   b. Foster Products Corporation, H. B. Fuller Company; 81-33.

   c. Or approved equal.

C. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Aeroflex USA Inc.; Aeroseal.

   b. Armacell LCC; 520 Adhesive.

   c. Foster Products Corporation, H. B. Fuller Company; 85-75.

   d. RBX Corporation; Rubatex Contact Adhesive.

   e. Or approved equal.

D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Products, Division of ITW; CP-82.

   b. Foster Products Corporation, H. B. Fuller Company; 85-20.

   c. ITW TACC, Division of Illinois Tool Works; S-90/80.

   d. Marathon Industries, Inc.; 225.

   e. Or approved equal.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following]:

   a. Dow Chemical Company (The); 739, Dow Silicone.

   b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

c. P.I.C. Plastics, Inc.; Welding Adhesive.

d. Red Devil, Inc.; Celulon Ultra Clear.

e. Speedline Corporation; Speedline Vinyl Adhesive.

f. Or approved equal.

2.04 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide the following provide one of the following:

a. Childers Products, Division of ITW; CP-35.

b. Foster Products Corporation, H. B. Fuller Company; 30-90.

c. ITW TACC, Division of Illinois Tool Works; CB-50.

d. Marathon Industries, Inc.; 590.

e. Or approved equal.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.

3. Service Temperature Range: Minus 20 to plus 180 deg F.

4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.

5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-10.

b. Foster Products Corporation, H. B. Fuller Company; 35-00.

c. ITW TACC, Division of Illinois Tool Works; CB-05/15.

d. Marathon Industries, Inc.; 550.

e. Or approved equal.

2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.

3. Service Temperature Range: Minus 20 to plus 200 deg F.

4. Solids Content: 63 percent by volume and 73 percent by weight.

5. Color: White.

2.05 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-76.

b. Foster Products Corporation, H. B. Fuller Company; 30-45.

c. Marathon Industries, Inc.; 405.

d. Or approved equal.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Permanently flexible, elastomeric sealant.

4. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).

5. Color: White or gray.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-76.

b. Or approved equal.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F.

5. Color: White.

2.06 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

2) Or approved equal.

2.07 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Zeston.

b. P.l.C. Plastics, lnc.; FG Series.

c. Proto PVC Corporation; LoSmoke.

d. Speedline Corporation; SmokeSafe.

e. Or approved equal.

2. Adhesive: As recommended by jacket material manufacturer.

3. Color: White.

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

5. Factory-fabricated tank heads and tank side panels.

2.08 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.

b. Compac Corp.; 104 and 105.

c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.

d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

e. Or approved equal.

2. Width: 3 inches.

3. Thickness: 11.5 mils.

4. Adhesion: 90 ounces force/inch in width.

5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch in width.

7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.

b. Compac Corp.; 130.

c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.

d. Venture Tape; 1506 CW NS.

e. Or approved equal.

2. Width: 2 inches.

3. Thickness: 6 mils.

4. Adhesion: 64 ounces force/inch in width.

5. Elongation: 500 percent.

6. Tensile Strength: 18 lbf/inch in width.

2.09 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

B. Wire: 0.062-inch soft-annealed, stainless steel soft-annealed, galvanized steel.

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

a. C & F Wire.

b. Childers Products.

c. PABCO Metals Corporation.

d. RPR Products, Inc.

e. Or approved equal.

2.10 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.02 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.

2. Testing agency labels and stamps.

3. Nameplates and data plates.

4. Manholes.

5. Handholes.

6. Cleanouts.

3.03 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Penetration Firestopping"irestopping and fire-resistive joint sealers.

3.04 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.05 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.

4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.

2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.06 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.

4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.

3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

4. Install insulation to flanges as specified for flange insulation application.

3.07 FIELD-APPLIED JACKET INSTALLATION

A. Provide PVC jackets on all exposed piping insulation and in equipment rooms and where indicated on the drawings. Install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturers recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.08 FINISHES

A. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

    a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.09 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.

2. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.

2. Underground piping.

3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

END OF SECTION

SECTION 22 11 13

FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

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

B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

1. Wiring Diagrams: Power, signal, and control wiring for alarms.

C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. 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.

D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

G. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.

2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

1. Notify the District no fewer than one days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without District's written permission.

1.8 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B), water tube, drawn temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
2. Copper, Pressure-Seal Fittings:

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

b. NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
c. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.

B. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

C. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.2 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Gaskets: AWWA C111, rubber.

C. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.

1. Grooved-End, Ductile-Iron Pipe Appurtenances:

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work .

b. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
c. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

D. Flanges: ASME 16.1, Class 125, cast iron.

2.3 PVC PIPE AND FITTINGS

A. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.

1. Comply with UL 1285 for fire-service mains if indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

    a. Gaskets: AWWA C111, rubber.

5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

    a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:

1. Standards: ASTM A 674 or AWWA C105.
2. Form: Sheet or tube.
3. Material: High-density, cross-laminated PE film of 0.008-inch minimum thickness.

2.5 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.

2. Nonrising-Stem, Metal-Seated Gate Valves:

    a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

        1) Standard: AWWA C500.
        2) Minimum Pressure Rating: 200 psig (1380 kPa).
        3) End Connections: Mechanical joint.
        4) Interior Coating: Complying with AWWA C550.

3. Nonrising-Stem, Resilient-Seated Gate Valves:

   a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

      1) Standard: AWWA C509.
      2) Minimum Pressure Rating: 200 psig (1380 kPa).
      3) End Connections: Mechanical joint.
      4) Interior Coating: Complying with AWWA C550.

4. OS&Y, Rising-Stem, Metal-Seated Gate Valves:

   a. Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.

      1) Standard: AWWA C500.
      2) Minimum Pressure Rating: 200 psig (1380 kPa).
      3) End Connections: Flanged.

5. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:

   a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.

      1) Standard: AWWA C509.
      2) Minimum Pressure Rating: 200 psig (1380 kPa).
      3) End Connections: Flanged.

2.6 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches (125 mm) in diameter.

   1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

B. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.7 CHECK VALVES

A. AWWA Check Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.

2. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.

    a. Standard: AWWA C508.
    b. Pressure Rating: 175 psig (1207 kPa).

2.8 DETECTOR CHECK VALVES

A. Detector Check Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.

2. Description: Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.

    a. Standards: UL 312 and FMG approved.
    b. Pressure Rating: 175 psig (1207 kPa).
    c. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.

3. Description: Iron body, corrosion-resistant clapper ring and seat ring material, flanged ends, with connections for bypass and installation of water meter.

    a. Standards: UL 312 and FMG approved.
    b. Pressure Rating: 175 psig (1207 kPa).

2.9 BACKFLOW PREVENTERS

A. Double-Check, Backflow-Prevention Assemblies:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.

2. Standard: AWWA C510.
3. Operation: Continuous-pressure applications, unless otherwise indicated.
4. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.

5. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 (DN 65) and larger.
6. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
7. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.

B. Backflow Preventer Test Kits:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.

2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.10 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.

2. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- (460-mm-) high brass sleeve; and round escutcheon plate.

a. Standard: UL 405.
b. Connections: Two NPS 2-1/2 (DN 65) inlets and one NPS 4 (DN 100) outlet.

2.11 ALARM DEVICES

A. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.

B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig (1725-kPa) working pressure; designed for horizontal or vertical installation; with 2 single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.

C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Division 22 Section "Common Work Results for Plumbing" for piping-system common requirements.

3.5 PIPING INSTALLATION

A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.

B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

C. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

D. Make connections NPS 2 (DN 50) and smaller with drilling machine according to the following:

1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
4. Install corporation valves into service-saddle assemblies.
5. Install manifold for multiple taps in water main.
6. Install curb valve in water-service piping with head pointing up and with service box.

E. Comply with NFPA 24 for fire-service-main piping materials and installation.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
2. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

G. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.

H. Bury piping with depth of cover over top at least 30 inches (750 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following:

1. Under Driveways: With at least 36 inches (910 mm) cover over top.
2. In Loose Gravelly Soil and Rock: With at least 12 inches (300 mm) additional cover.

I. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

J. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

K. Sleeves are specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

L. Mechanical sleeve seals are specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

M. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

N. See Division 21 Section "Water-Based Fire-Suppression Systems" for fire-suppression-water piping inside the building.

O. See Division 22 Section "Domestic Water Piping" for potable-water piping inside the building.

3.6 JOINT CONSTRUCTION

A. See Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
4. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

3.7 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
4. Fire-Service-Main Piping: According to NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

D. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves.

E. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.

3.9 DETECTOR-CHECK VALVE INSTALLATION

A. Install in vault or aboveground.

B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.

C. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

3.10 BACKFLOW PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.

C. Do not install bypass piping around backflow preventers.

D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.11 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Install ball drip valves at each check valve for fire department connection to mains.

B. Install protective pipe bollards on two sides of each fire department connection. Pipe bollards are specified in Division 05 Section "Metal Fabrications."

3.12 ALARM DEVICE INSTALLATION

A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.

B. Supervisory Switches: Supervise valves in open position.

1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.

C. Locking and Sealing: Secure unsupervised valves as follows:

1. Valves: Install chain and padlock on open OS&Y gate valve.
2. Post Indicators: Install padlock on wrench on indicator post.

D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.

E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.

F. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Division 28 Section "Fire Detection and Alarm."

3.13 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. See Division 22 Section "Common Work Results for Plumbing" for piping connections to valves and equipment.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.14 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.15 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 22 Section "Common Work Results for Plumbing" for identifying devices.

3.16 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

    a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. Section Includes:

1. Domestic water pipes, tubes, fittings, and specialties inside the building.

2. Escutcheons.

3. Sleeves and sleeve seals.

4. Wall penetration systems.

B. Related Section:

1. Division 22 Section Domestic Water Piping Specialties

1.03 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to Section 1632 Part 2 C.B.C.

1.04 SUBMITTALS

A. Product Data: For Pipe, Tube, Fittings and Couplings.

B. Water Samples: Specified in "Cleaning" Article.

C. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Fire-suppression-water piping.

2. Domestic water piping.

D. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.06 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Comply with requirements in Part 3 "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 COPPER PIPE FITTINGS

A. Hard Copper Pipe: ASTM B 88, Type L and ASTM B 88, Type M water pipe, drawn temper.

1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends

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

a. Elkhart Products Corporation; Industrial Division.

b. NIBCO INC.

c. Viega; Plumbing and Heating Systems.

d. Or approved equal.

2.03 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.04 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

2.05 SPECIALTY VALVES

A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.

B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

2.06 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.

2. Pressure rating at least equal to pipes to be joined.

3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

2.07 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

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

a. Capitol Manufacturing Company.

b. Central Plastics Company.

c. EPCO Sales, Inc.

d. Hart Industries International, Inc.

e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

f. Zurn Plumbing Products Group; Wilkins Water Control Products.

g. Or approved equal.

2. Description:

a. Pressure Rating: 150 psig at 180 deg F.

b. End Connections: Solder-joint copper alloy and threaded ferrous.

2.08 ESCUTCHEONS

A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.

B. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.

C. One Piece, Deep Pattern: Deep-drawn, box-shaped brass with chrome-plated finish.

D. Split Casting, Cast Brass: Polished, chrome-plated finish with concealed hinge and setscrew.

E. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

F. Split-Casting Floor Plates: Cast brass with concealed hinge.

2.09 SLEEVES

A. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

2.10 SLEEVE SEALS

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

1. Advance Products & Systems, Inc.

2. Calpico, Inc.

3. Metraflex, Inc.

4. Pipeline Seal and Insulator, Inc.

5. Or approved equal.

B. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2. Pressure Plates: Plastic.

3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.11 WALL PENETRATION SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. SIGMA.

B. Description: Wall-sleeve assembly, consisting of housing and gland, gaskets, and pipe sleeve.

1. Carrier-Pipe Deflection: Up to 5 percent without leakage.

2. Housing: Ductile-iron casting with hub, waterstop, anchor ring, and locking devices. Include gland, bolts, and nuts.

3. Housing-to-Sleeve Gasket: EPDM rubber.

4. Housing-to-Carrier-Pipe Gasket: AWWA C111, EPDM rubber.

5. Pipe Sleeve: ASTM A 53/A 53M, Schedule 40, zinc-coated steel pipe.

2.12 GROUT

PART 3 - EXECUTION

3.01 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.02 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Buried Pipe Wrapping

1. All copper pipes for installation below ground shall be shop wrapped.

2. Prior to wrapping, pipe shall be cleaned with a non-oily solvent and then cleaned thoroughly with a wire brush.

3. After cleaning, pipe shall be spirally wrapped with 2" wide 20 mils thick Manville Trantex VID-20 polyvinyl chloride pressure sensitive tape with ½" lap without wrinkles.

4. All fittings and field joints in buried copper piping shall be wrapped. Prior to wrapping, fittings and field joints shall be washed with a non-oily solvent and then cleaned with a wired brush. After cleaning, fittings and field joints shall be coated and wrapped as follows:

a. Coat of Koppers "Jet-Set" coal tap primer, applied uniformly to dry surface.

b. Two layers of 2" wide 35 mils thick Polyken 931 black butyl rubber molding tape with 1" lap, covered with one layer of ¾"

wide 15 mils thick Polyken 930 black polyethylene pressure sensate tape with ¼" lap.

c. Field wrapping shall extend 3 in. over undisturbed shop applied pipe coating.

D. Install 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. Sleeves and mechanical sleeve seals are herein before specified in Part 2 - Products.

E. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are herein before specified in Part 2 - Products.

F. Install shutoff valve, five (5) feet outside building at each domestic water service entrance.

G. Install shutoff valve immediately upstream of each dielectric fitting.

H. Install domestic water piping level and plumb.

I. Install seismic restraints on piping. Comply as herein before specified in Part 1

J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

K. 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.

L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

M. Install piping adjacent to equipment and specialties to allow service and maintenance.

N. Install piping to permit valve servicing.

O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

P. Install piping free of sags and bends.

Q. Install fittings for changes in direction and branch connections.

R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

S. Install pressure gauges on suction and discharge piping from each plumbing pump.

T. Install thermometers on outlet piping from each water heater.

3.03 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.04 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, where required to drain water piping.

3.05 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fitting-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping: Plastic-to-metal transition fittings.

3.06 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.07 PIPE HANGER AND SUPPORT INSTALLATION

A. Vertical Piping: MSS Type 8 or 42, clamps.

1. Individual, Straight, Horizontal Piping Runs:

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.

2. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

3. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for copper piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.

2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.

3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

4. NPS 2-1/2 : 108 inches with 1/2-inch rod.

5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

6. NPS 6: 10 feet with 5/8-inch rod.

7. NPS 8: 10 feet with 3/4-inch rod.

E. Install supports for vertical copper tubing every 10 feet.

F. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.08 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.09 ESCUTCHEON INSTALLATION

A. Install escutcheons for penetrations of walls, ceilings, and floors.

B. Escutcheons for New Piping:

1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.

2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.

3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.

4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with rough-brass finish.

5. Bare Piping in Equipment Rooms: One piece, stamped steel with set screw

6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

3.10 SLEEVE INSTALLATION

A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.

B. Sleeves are not required for core-drilled holes.

C. Permanent sleeves are not required for holes formed by removable PE sleeves.

D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.

E. Install sleeves in new partitions, slabs, and walls as they are built.

F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.

G. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.

H. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using wall penetration systems specified in this Section.

I. Seal space outside of sleeves in concrete slabs and walls with grout.

J. Install sleeves that are large enough to provide ½ inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.

K. Install sleeve materials according to the following applications:

1. Sleeves for Piping Passing through Concrete Floor Slabs:

    a. 24 Gauge Galvanized Sheet Metal.

2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Cast Iron Pipe.

    a. Extend sleeves 2 inches above finished floor level.

    b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

3. Sleeves for Piping Passing through Gypsum-Board Partitions:

    a. 24 Gauge Galvanized-steel sheet sleeves for pipes NPS 6 and larger.

    b. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.

4. Sleeves for Piping Passing through Concrete Roof Slabs:

   a. 24 Gauge Galvanized sheet metal.

5. Sleeves for Piping Passing through Exterior Concrete Walls:

   a. Do not use sleeves when wall penetration systems are used.

   b. For watertight condition use cast iron pipe sleeves.

   c. Where wet conditions do not occur use Schedule 40 PVC pipe.

6. Sleeves for Piping Passing through Interior Concrete Walls:

   a. 24 Gauge Galvanized-steel sheet.

L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

3.11 SLEEVE SEAL INSTALLATION

A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.

B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.12 WALL PENETRATION SYSTEM INSTALLATION

A. Install wall penetration systems in new, exterior concrete walls.

B. Assemble wall penetration system components with sleeve pipe. Install so that end of sleeve pipe and face of housing are flush with wall. Adjust locking devices to secure sleeve pipe in housing.

3.13 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.

3.14 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

   b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

3. Leave new, domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

4. Cap and subject piping to water pressure of 125 psig. Isolate test source and allow standing for not less than one (1) hour. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.15 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibs.

2. Open shutoff valves to fully open position.

3. Open throttling valves to proper setting.

4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.

   b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.

6. Remove and clean strainer screens. Close drain valves and replace drain plugs.

7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.

8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.16 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

   b. Fill and isolate system according to either of the following:

      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.

      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

d. Submit water samples in sterile bottles to sterilization laboratory. Repeat procedures if biological examination shows contamination.

B. The entire domestic watersystem shall be sterilized after the piping has been tested but before acceptance of work for operation.

C. Name of sterilization laboratory shall be submitted for Architect's review prior to the start of water sterilization.

1. No water sterilization shall be done prior to the review of the laboratory by the Architect.

D. A certificate of sterilization, bearing the signature of an official of the water sterilization, shall be submitted to the Architect.

3.17 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building service piping, NPS 3 and smaller, shall be the following:

1. Hard Drawn copper pipe, ASTM B 88, Type L ASTM B 88M with wrought-copper solder-joint fittings.

E. Under-building-slab, domestic water, shall be the following:

1. Hard Drawn Copper Pipe with ASTM B 88, Type K; wrought-copper solder-joint fittings; and brazed joints.

F. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:

1. Hard copper pipe, ASTM B 88, Type L wrought- copper solder-joint fittings;

G. Aboveground domestic water piping, NPS 2-1/2 to NPS 4 , shall be the following:

1. Hard copper pipe, ASTM B 88, Type L wrought- copper solder-joint fittings.

3.18 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller. Use butterfly, with flanged ends for piping NPS 2-1/2 (DN 65) and larger.

2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.

3. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION

SECTION 22 11 19

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

`In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Air gap fittings.
2. Backflow preventers.
3. Solenoid valves.
4. Water pressure-reducing valves.
5. Balancing valves.
6. Thermostatic controller assemblies.
7. Strainers.
8. Hose bibs and stops.
9. Water hammer arresters.
10. Trap-seal primer.

B. Related Sections include the following:

1. Division 22 Section "Domestic Water Piping" for water meters.
2. Division 22 Section "Emergency Plumbing Fixtures" for water tempering equipment.
3. Division 22 Section "Drinking Fountains and Water Coolers" for water filters for water coolers.

1.03 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

1.04 SUBMITTALS

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

B. Field quality-control test reports.

1.05 QUALITY ASSURANCE

A. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.

2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.01 AIR GAP FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide the following:

B. Description: Jay R. Smith: Air gap fitting: Model 3951 bronze unit with screwed outlet.

2.02 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

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

a. Conbraco Industries, Inc.

b. Zurn Plumbing Products Group; Wilkins Div.

c. Or approved eqaul.

2. Standard: ASSE 1013.

3. Description:

a. 2" and Smaller: Watts 909-QT, 175# reduced pressure type unit with two full port ball valves with resilient seats, two spring loaded check valves, test cocks and relief valves.

b. 2 ½" and Larger: Watts909-RW 175# reduced pressure type with two non-rising stem gate valves with resilient seats, two spring loaded check valves, test cocks and relief valve.

c. Assemblies shall be U.S.C., I.A.P.M.O. and County Health Department listed at the time of installation.

2.03 SOLENOID VALVES:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

B. Basis-Of-Design Product: Subject to compliance with requirements, provide the following or a comparable product.

C. Description: ASCO 8200 Series, U.L. listed, 250#, 200 degrees F screwed N.O. bronze body valve with Teflon seat.

2.04 WATER PRESSURE-REDUCING VALVES

A. Water Regulators

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

a. Wilkins

b. Watts Industries, Inc.; Water Products Div.

c. Or approved equal.

3. Description: Wilkins 500-YSBR Series, 300# I.A.P.M.O. listed screwed all bronze spring loaded diaphragm adjustable unit with integral by-pass, union and strainer with blow-off hose bibb.

2.05 BALANCING VALVES

A. Memory-Stop Balancing Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

a. Conbraco Industries, Inc.

b. Milwaukee Valve Company.

c. NIBCO INC.

d. Or approved equal.

3. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.

4. Pressure Rating: 400-psig minimum CWP.

5. Size: NPS 2 or smaller.

6. Body: Copper alloy.

7. Port: Standard or full port.

8. Ball: Chrome-plated brass.

9. Seats and Seals: Replaceable.

10. End Connections: Solder joint or threaded.

11. Handle: Vinyl-covered steel with memory-setting device.

2.06 THERMOSTATIC CONTROLLER ASSEMBLIES

A. Water-Temperature Limiting Devices:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

3. Basis-of-Design Product: Subject to compliance with requirements, provide Powers; a Watts Industries Co. or a comparable product by one of the following:

a. Leonard Valve Company.

4. Description:

a. Powers Model 432-B-D-M-S-O assembly with rough chrome plated thermostatic controller with triple duty check stops, top piping inlets, top piping outlet, tempered outlet valve, tempered water dial thermometer and cold water by-pass valve.

5. Assemblies shall be exposed, without cabinets.

2.07 STRAINERS FOR DOMESTIC WATER PIPING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Metraflex.

2. Watts.

C. Description:

1. Strainers shall be Y type with semi-steel body and stainless steel screen with perforations to suit service requirements. Strainers shall be pipe size.

2. 2" and Smaller: Metraflex S series, 250# screwed body with screwed cap.

3. 2 ½"and Larger: Metraflex M1K series, 125# flanged body with flanged gasketed cap.

4. Strainers shall be provided with Chicago 293-E27 brass body blow-off hose bibb with ¾"hose end. Copy and edit paragraph and subparagraphs below for each type of Y-pattern strainer required. If only one type is required, drawing designation may be omitted.

2.08 HOSE BIBBS (MILD CLIMATE) AND STOPS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Acorn.

2. Chicago.

C. Description:

HB-1 Acorn #8140 recessed hose box with ¾" hose connection and non-removable backflow preventer and with wall frame & door. Provide with Chicago faucet model #387-827CP. 2 ¼" tee handle with tapered broach. Polished chromed plated finish solid brass construction. ¾" female NPT female inlet, ¾" male garden hose threaded outlet.

HB-2 Chicago faucet model #387-827CP. 2¼" tee handle with tapered broach, polished chromed plated finish solid brass construction. ¾" female MPT female inlet, ¾" male garden hose threaded outlet.

Partition Stops: Chicago 1771 ½"chrome plated loose key operated brass body.

Straight Stops: Chicago 45-LK ½"chrome plated loose key operated brass body.

2.09 WATER HAMMER ARRESTERS

A. Water Hammer Arresters:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

a. Jay R. Smith.

b. Wade.

3. Description: Smith "Hydrotrol" 5000 Series P.D.I certified bellows type units of all stainless steel construction.

a. P.D.I symbol "A" hydrotrol figure number 5005.

b. P.D.I symbol "B" hydrotrol figure number 5010.

c. P.D.I symbol "C" hydrotrol figure number 5020.

d. P.D.I symbol "D" hydrotrol figure number 5030

4. Piston type water hammer arresters shall not be used.

B. Drainage-Type, Trap-Seal Primer Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

a. MIFAB.

b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

3. Discription: MIFAB model #MR-500 pressure drop activated brass housing with removable filter screen, and MIFAB model MI-DU trap primer distribution unit to serve two, three or four drains from a single MR-500 primer.

4. Trap primers shall be provided for all floor drains and floor sinks.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" 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 be sources of contamination. Comply with authorities having jurisdiction.

1. Install drain for backflow 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.

2. Do not install bypass piping around backflow preventers.

C. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

F. Install Y-pattern strainers where indicated on the drawings.

G. Install water hammer arresters in water piping according to PDI-WH 201.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.03 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.04 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION

SECTION 22 13 13

FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Cleanouts.

1.3 DEFINITIONS

1.4 SUBMITTALS

A. Product Data: For the following:

1. Pipe and fittings.

B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

D. Profile Drawings: Show system piping in elevation. Draw profiles to horizontal scale of not less than 1 inch equals 50 feet (1:500) and to vertical scale of not less than 1 inch equals 5 feet (1:50). Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

E. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.

F. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.6 PROJECT CONDITIONS

1. Notify the District no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without District's written permission.

PART 2 - PRODUCTS

2.1 ABS PIPE AND FITTINGS

A. ABS Sewer Pipe and Fittings: ASTM D 2751, with bell-and-spigot ends for gasketed joints.

1. NPS 3 to NPS 6 (DN 80 to DN 150): SDR 35.
2. NPS 8 to NPS 12 (DN 200 to DN 300): SDR 42.

B. Gaskets: ASTM F 477, elastomeric seals.

2.2 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work.

2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
3. Top-Loading Classification(s): Heavy Duty.
4. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work.

2. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
2. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping with 36-inch (915-mm) minimum cover unless otherwise approved.
4. Install ABS sewer piping according to ASTM D 2321 and ASTM F 1668.

G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:
   1. Join ABS sewer piping according to ASTM D 2321 and ASTM D 2751 for elastomeric-seal joints.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

B. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste and Vent Piping."

B. Make connections to existing piping and underground manholes.

   1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch (150-mm) overlap with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
   2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).

   3. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.6 CLOSING ABANDONED SANITARY SEWER SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth

pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8-inch- (203-mm-) thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:

1. Remove manhole and close open ends of remaining piping.
2. Remove top of manhole down to at least 36 inches (915 mm) below final grade. Fill to within 12 inches (300 mm) of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade according to Division 31 Section "Earth Moving."

3.7 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.8 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    c. Infiltration: Water leakage into piping.
    d. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

    a. Fill sewer piping with water. Test with pressure of at least 10-foot (3-m) head of water, and maintain such pressure without leakage for at least 15 minutes.
    b. Close openings in system and fill with water.
    c. Purge air and refill with water.
    d. Disconnect water supply.
    e. Test and inspect joints for leaks.

6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

    a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
    b. Option: Test concrete gravity sewer piping according to ASTM C 924 (ASTM C 924M).

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.9 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building; and to five (5) feet exterior of building.

1. Pipe, tube, and fittings.

2. Special pipe fittings.

B. Related Sections include the following:

1. Division 22 Section "Chemical Waste Systems for Laboratory Facilities" for chemical-waste and vent piping systems.

1.03 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

1.04 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to "Minimum Design Loads for Buildings and Other Structures." In accordance with "Mason Industries" seismic restraint guidelines for seismic for restraint of mechanical systems. OSHPD pre-approval #OPA-0349

1.05 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B LEED Submittal:

1. Product Data for Credit EQ 4.1: Solvent cements and adhesive primers, including printed statement of VOC content.

2. Product Data shall indicate hubless cast iron soil pipe and fittings "Green Spec. Listed," product shall comply to ASTM A74, ASTM A888 and CISPI 301 standards.

C. Field quality-control inspection and test reports.

1.06 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.01 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.

2.02 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.03 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301; Latest issue shall apply.

1. Manufactures:

a. AB&I

b. Tyler

c. Charlotte

B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop. All no-hub shielded couplings must have four bands minimum. Sizes 5" through 10" shall have six bands minimum.

1. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.

a. Manufacturers:

1) Husky SD4000

2) Clamp-All Corp.

3) Ideal Div.; Stant Corp.

4) Mission Rubber Co. Heavy Weight

5) Tyler Pipe; Soil Pipe Div.

2. Heavy-Duty, Shielded, Cast-Iron Couplings: ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve.

a. Manufacturers:

1) MG Piping Products Co.

2.04 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Standard Weight or Schedule 40, galvanized. Include ends matching joining method.

B. Drainage Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.

C. Pressure Fittings:

1. Steel Pipe Nipples: ASTM A 733 made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.

2. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.

3. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.

4. Cast-Iron Flanges: ASME B16.1, Class 125.

5. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125, galvanized.

2.05 PVC PIPE AND FITTINGS

A. Cellular-Core PVC Pipe: ASTM D-1784, Schedule 40.

1. Joints: Bell and spigot with rubber ring.

2. PVC Fittings: Bell and spigot rubber ring ASTM D-1784.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings heavy-duty four band shielded, hubless-coupling joints.

2. Steel pipe, drainage fittings, and threaded joints.

C. Aboveground, soil and waste piping NPS 5 and larger shall be the following:

1. Hubless cast-iron soil pipe and fittings heavy-duty six band shielded, hubless-coupling joints.

2. Steel pipe, drainage fittings, and threaded joints.

D. Aboveground, vent piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, hubless-coupling joints.

2. Steel pipe, drainage fittings, and threaded joints.

a. Option for Vent Piping, NPS 2½ and NPS 3½: Hard copper tube, Type M; copper pressure fittings; and soldered joints.

E. Aboveground, vent piping NPS 5 and larger shall be the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.

2. Steel pipe, drainage fittings, and threaded joints.

F. Underground; below building slab soil, waste, and vent piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings with MG cast-iron couplings and stainless steel bolts.

G. Yard, outside of building, soil and waste piping shall be the following:

1. Solid wall PVC Pipe with bell and spigot and rubber ring.

2. Dissimilar Pipe- Material Couplings for nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD. Shall be made with "Calder rubber couplings with stainless steel clamps.

H. Underground, below the slab, soil and waste piping NPS 5 and larger shall be the following:

1. Hubless cast-iron soil pipe and fittings with MG cast iron couplings; and stainless steel bolts.

I. Yard, outside of building, soil and waste piping shall be the following:

1. Solid-wall, Schedule 40, PVC Pipe with bell and spiqot with rubber.

2. Dissimilar Pipe- Material Couplings for nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD. Shall be made with "calder rubber couplings with stainless steel clamps.

3.03 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

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. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

E. Install wall-penetration fitting at each service pipe penetration through foundation wall. Make installation watertight.

F. Provide special precautions for sanitary soil waste (sanitary drainage) and rain water(storm drainage) pipe over electrical rooms, kitchens, food preparation and serving areas to protect these areas from pipe leakage. Comply with the requirements of CCR Title 24, Part 5, Section 311.9.

G. 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."

Install encasement on underground piping according to ASTM A 674 or AWWA C105.

H. 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.

I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert.

J. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow.

2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.

3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

K. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

L. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.04 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

C. All joints of buried hubless cast iron pipe and cast iron couplings shall be field wrapped.

1. Prior to wrapping, fittings and field joints shall be washed with a non-oily solvent and then cleaned with a wire brush. After cleaning, fittings and field joints shall be coated and wrapped as follows:

a. Coat of Koppers "Jet-Set" coal tap primer, applied uniformly to dry surfaces.

b. Two layers of 2" wide 35 mils thick Polyken 931 black butyl rubber molding tape with 1" lap, covered with one layer of ¾" wide 15 mils thick Polyken 930 black polyethylene pressure sensitive tape with ¼" lap.

c. Field wrapping shall extend 3 inches beyond point.

D. Joints of hubless cast iron soil pipe above ground shall be made up with Class I rated couplings as approved be Factory Mutual Research Coporation, Approval Standard Class Number 1680, "Clamp-All" coupling, or equal.

3.05 VALVE INSTALLATION

A. General valve installation requirements are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

3.06 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.

2. Install 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.

C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8" (10mm) minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.

2. NPS 3: 60 inches with 1/2-inch rod.

3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.

4. NPS 6: 60 inches with 3/4-inch rod.

5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.

2. NPS 1-1/2: 108 inches with 3/8-inch rod.

3. NPS 2: 10 feet with 3/8-inch rod.

4. NPS 2-1/2: 11 feet with 1/2-inch rod.

5. NPS 3: 12 feet with 1/2-inch rod.

6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

7. NPS 6: 12 feet with 3/4-inch rod.

8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.07 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

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.

2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.

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.

3.08 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. 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 or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, and test hydrostatically under 5 P.S.I. pressure for not less then one (1) hour.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.09 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 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts.
2. Floor drains.
3. Floor sinks.
4. Roof sinks.
5. Miscellaneous sanitary drainage piping specialties.
6. FOG disposal systems.
7. Grease interceptors.

B. Related Sections include the following:

1. Division 22 Section "Storm Drainage Piping Specialties" for roof drains and overflow drains.
2. Division 22 Section "Plumbing Fixtures" for hair interceptors.

1.03 DEFINITIONS

A. FOG: Fats, oils, and greases.

B. PE: Polyethylene plastic.

C. PVC: Polyvinyl chloride plastic.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. FOG disposal systems.
2. Grease interceptors.

1.05 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.01 CLEANOUTS

A. Metal Cleanouts:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

3. Basis-of-Design Product: Subject to compliance with requirements, provide Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. or a comparable product by one of the following:

   a. Wade

   b. Josam Company; Josam Div.

   c. MIFAB, Inc.

4. Desription:

   a. Cleanouts shall have cast iron body with countersunk slotted tapered thread bronze plug.

   b. Exterior Cleanouts:

      1. Cast Iron Pipe: Smith 4283 assembly in access box; access box as hereinbefore specified in Section 15050.

      2. Polyvinyl Chloride Pipe: Smith 4283 assembly with stainless steel clamp coupling in access box; access box as hereinbefore specified in Section 22 05 00.

   c. Interior Wall Cleanouts:

      1. Smith 4472 assembly with stainless steel shallow cover.

      2. Where job conditions do not permit use of shallow covers, Smith 4715 chrome plated bronze deep covers shall be used.

   d. Interior Floor Cleanouts: Smith 4023 assembly with scoriated adjustable screw secured polished round nickel bronze tops.

2.02 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

3. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith or a comparable product by one of the following:

   a. Wade

   b. Josam Company; Josam Div.

   c. MIFAB, Inc.

4. Description:

   a. FD-1: J.R. Smith #2005-A duco cast iron body & flashing collar with protector cap and 5" round adjustable strainer head, bottom outlet with trap primer connection.

2.03 FLOOR SINKS

A. Cast Iron Floor Sinks

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following.

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

3. Basis-Of-Design Product: Subject to compliance with requirements, provide Smith, Jay R. Mfg. Co Division of Smith Industries, Inc. or a comparable product by one of the following:

   a. Wade

4. Description:

   a. FS-1: J.R. Smith #3430 cast iron body & flashing collar with protector cap and 12" square grate, bottom outlet with trap primer connection.

2.04 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Vent Caps and Flashing Assemblies:

1. Description: Stoneman "Stormtite" Assemblies: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.

   a. Steel pipe 1100-3 Assembly.

   b. Cast iron pipe 1100-5 Assembly.

2. Size: Same as connected stack vent or vent stack.

3. For flashing refer to division 07.

B. Air Gap Fitting:

1. Description: Smith 3951 bronze unit with screwed outlet.

2.05 GREASE INTERCEPTORS

A. Grease Interceptors

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

3. Basis-of-Design Product: Subject to compliance with requirements, provide Jensen Precast or a comparable product.

4. Description:

a. Jensen concrete precast unit with, 24" cast iron frame, traffic covers gaskets with extensions and 24" dia. sampling box complete with extensions and traffic cover.

b. The entire interceptor body shall rest on solid ground and the extension top shall be set flush with the finished surface.

c. The assembly and its installation shall comply with the requirements of Governing Sanitation District.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. 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.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

H. Install through-penetration firestop assemblies in stacks at floor penetrations.

I. Assemble open drain fittings and install with top of hub above floor.

J. Install deep-seal traps on floor drains and other waste outlets, if indicated.

K. Install trap-seal primer fittings on inlet to floor drains and floor sinks.

1. Size: Same as floor drain inlet.

L. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

M. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

N. Install vent caps on each vent pipe passing through roof.

O. Install grease interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

1. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

P. Install wood-blocking reinforcement for wall-mounting-type specialties.

Q. Install traps on plumbing specialty drain outlets.

R. 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.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3.04 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 14 23

STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following storm drainage piping specialties:

1. Roof drains and overflow drains.

2. Miscellaneous storm drainage piping specialties.

B. Related Sections include the following:

1. Division 22 Section "Sanitary Waste Piping Specialties" for floor drains, systems connected to sanitary sewer and grease interceptors.

1.03 DEFINITIONS

A. PE: Polyethylene plastic.

B. PP: Polypropylene plastic.

C. PVC: Polyvinyl chloride plastic.

1.04 SUBMITTALS

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

1.05 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.06 COORDINATION

A. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.01 ROOF DRAINS AND OVERFLOW DRAINS, AREA DRAINS

A. Metal Roof Drains:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

3. Basis-of-Design Product: Subject to compliance with requirements, provide Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. or a comparable product by one of the following:

a. Josam Company; Josam Div.

b. MIFAB, Inc.

4. Description:

a. RD-1: Roof Drain: Smith 1010-Y-CRU 15" diameter assembly with hubless cast iron body with bottom outlet, flashing device, underdeck clamp, sump receiver and plastic dome strainer with vandalproof mounting.

b. OD-1: Overflow Drain: Smith 1080-Y-CRU 15" dia. assembly with hubless cast iron body with bottom outlet, 2" high water dam, flashing device, underdeck clamp, sump receiver and plastic dome strainer with vandalproof mounting.

c. AD-1: Area Drain: J.R. Smith #2005 duco cast iron body and flashing collar with protector cap and 6" round stainless steel adjustable strainer head, bottom outlet with trap primer connection.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install roof drains and overflow drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Roofing materials are specified in Division 07.

1. Install roof drain and overflow drain flashing collar or flange so that there will be no leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.

2. Position roof drains for easy access and maintenance.

C. 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.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.03 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

   Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

   In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

   "Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following conventional plumbing fixtures and related components:

1. Faucets for lavatories and sinks.
2. Flushometers.
3. Toilet seats.
4. Protective shielding guards.
5. Fixture supports.
6. Water closets.
7. Urinals.
8. Lavatories.
9. Commercial sinks.
10. Service basins.
11. Laboratory sink trim.
12. Laboratory trim.

B. Related Sections include the following:

1. Division 10 Section "Toilet, Bath, and Laundry Accessories."
2. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers, floor drains, and specialty fixtures not included in this Section.
3. Division 22 Section "Emergency Plumbing Fixtures."
4. Division 22 Section "Drinking Fountains and Water Coolers."
5. Division 31 Section "Facility Water Distribution Piping" for exterior plumbing fixtures.

1.03 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

C. PVC: Polyvinyl chloride plastic.

D. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.04 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

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. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act" and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.

2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.

3. Slip-Resistant Bathing Surfaces: ASTM F 462.

4. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.

5. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.

6. Vitreous-China Fixtures: ASME A112.19.2M.

7. Water-Closet, Flush Valve: ASME A112.19.5.

8. Waterless Urinals, ASME A112.19.19-2006 standard for vitreous chins non-water urinals and/or IAPMO 161-2007

H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.

2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.

3. Faucets: ASME A112.18.1.

4. Hose-Connection Vacuum Breakers: ASSE 1011.

5. Hose-Coupling Threads: ASME B1.20.7.

6. Integral, Atmospheric Vacuum Breakers: ASSE 1001.

7. NSF Potable-Water Materials: NSF 61.

8. Pipe Threads: ASME B1.20.1.

9. Supply Fittings: ASME A112.18.1.

10. Brass Waste Fittings: ASME A112.18.2.

I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Atmospheric Vacuum Breakers: ASSE 1001.

2. Brass and Copper Supplies: ASME A112.18.1.

3. Dishwasher Air-Gap Fittings: ASSE 1021.

4. Manual-Operation Flushometers: ASSE 1037.

5. Brass Waste Fittings: ASME A112.18.2.

J. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Disposers: ASSE 1008 and UL 430.

2. Flexible Water Connectors: ASME A112.18.6.

3. Floor Drains: ASME A112.6.3.

4. Grab Bars: ASTM F 446.

5. Hose-Coupling Threads: ASME B1.20.7.

PART 2 - PRODUCTS

A. Refer to Plumbing Equipment Schedule on the Plumbing drawings sheet P-0.2.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Plumbing fixtures shall be furnished in white color unless otherwise herein specified.

B. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

C. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install counter-mounting fixtures in and attached to casework.

F. Install fixtures level and plumb according to roughing-in drawings.

G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

J. Plumbing fixture trim and exposed supplies and wastes shall be polished chrome plated brass unless otherwise herein specified.

K. Exposed wastes between trap and wall may be galvanized steel nipples with polished chrome plated casings.

L. Concealed wastes above ground may be galvanized steel pipe, and concealed supplies and traps above ground may be rough brass.

M. Install flushometer valves for accessible water closets and with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

N. Install toilet seats on water closets.

O. Install trap-seal liquid in dry urinals.

P. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

Q. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

R. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

S. Install shower flow-control fittings with specified maximum flow rates in shower arms.

T. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.

2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

U. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

V. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Install on countertop at sink. Connect inlet hose to dishwasher and outlet hose to disposer.

W. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if

required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."

X. Set service basins in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results for Plumbing."

Y. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Provisions shall be made for cold water supply to all urinals (3/4" pipe size). Piping shall be capped for future replacement of 1 gpf hand flush valve type urinals.

3.04 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.05 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust disposers and controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Install fresh batteries in sensor-operated mechanisms.

3.06 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.

2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.07 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 47 00

DRINKING FOUNTAINS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1. Submittal scheduling 01 32 00

2. Submittal Procedures 01 33 00

3. Substitution Procedures 01 25 00

Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts. Any changes required by the furnishing and installation of substituted material, equipment and other item shall be arranged for and paid for by the contractor; any expense incurred is part of this contract.

4. Equivalent Equipment 01 25 00

In addition to detailed specifications of materials and equipment, the specifications make reference to "substitutions" which is not to be, construed as equivalent.

"Equivalent equipment" will be considered as complying with the contract documents if the quality, features, performance, physical shape and appearance of the "equivalent equipment" are in the Architect's opinion the same or similar to those of the material and equipment described in detailed specifications.

5. Drawings and Specifications The drawings and specifications are deemed to be complementary. In case of discrepancy or overlapping conflicting requirements between the drawings and the specifications, the contractor shall provide the more expensive alternate unless he has obtained a written clarification prior to bid opening. Anything shown on the drawings and not mentioned in the specifications, and not shown on the drawings, shall be deemed to have mentioned in both. Should the material and equipment shown on the drawings not be specified by name, model number and description, the contractor shall provide such material and equipment in accordance with the Architect's selection unless he has obtained a written clarification prior to bid opening.

1.02 SUMMARY

A. This Section includes the following drinking fountains and electric drinking fountains and related components:

1. Drinking fountains.

2. Water-station water coolers.

3. Fixture supports.

1.03 DEFINITIONS

A. Accessible Drinking Fountain: Fixture that can be approached and used by people with disabilities.

B. Drinking Fountain: Fixture with nozzle for delivering stream of water for drinking.

C. Fitting: Device that controls flow of water into or out of fixture.

D. Fixture: Drinking fountain or electric drinking fountain unless one is specifically indicated.

E. Electric Drinking Fountain: Electrically powered fixture for generating and delivering cooled drinking water.

1.04 SUBMITTALS

A. Product Data: For each fixture indicated. Include rated capacities, furnished specialties, and accessories.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For fixtures to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

A. 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.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for fixtures for people with disabilities.

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

D. ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.

E. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.

F. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 DRINKING FOUNTAINS

A. Drinking Fountains:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

3. Basis-of-Design Product: Subject to compliance with requirements, provide Haws Corporation or a comparable product by one of the following:

   a. Sunroc Corp.

4. Description:

   a. DF-1 Haws wall mounted drinking fountain model #1501, barrier free "hi-lo" dual white enameled-iron basins, push button operated valves with front accessible cartridge and flow adjustment, polished chrome plated vandal resistant bubbler heads, polished chrome plated vandal resistant waste strainers, vandal resistant bottom plates, white powder coated stainless steel back panel with matching in-wall mounting plate, and 1 ¼" IPS mounting straps.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.

B. Examine walls and floors for suitable conditions where fixtures are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

A. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

3.03 INSTALLATION

A. Install mounting frames affixed to building construction and attach recessed water coolers to mounting frames, unless otherwise indicated.

B. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.

C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

E. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."

F. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.04 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.05 FIELD QUALITY CONTROL

A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.

1. Remove and replace malfunctioning units and retest as specified above.

2. Report test results in writing.

3.06 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.07 CLEANING

A. After completing fixture installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

END OF SECTION