

TECHINICAL SPECIFICATIONS
RELOCATION OF ONE MODULAR CLASSROOM BUILDING
AND
CONSTRUCTION OF TWO FABRIC SHADE STRUCTURES
AT
VENTURA COLLEGE CHILD DEVELOPMENT CENTER

Prepared by:

AMADOR WHITTLE ARCHITECTS, INC.
28328 Agoura Road, Suite 203
Agoura Hills CA 91301

For OWNER:

VENTURA COLLEGE
VENTURA COMMUNITY COLLEGE DISTRICT
761 Daily Drive, Camarillo CA 93010



Jean Amador, ARCHITECT



Will Lambert, STRUCTURAL ENGINEER



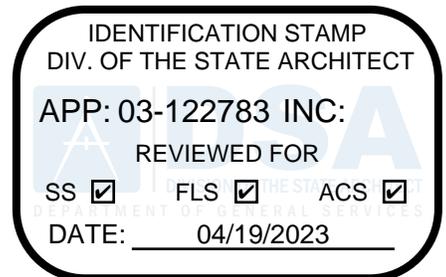
Hugh McTernan, MECHANICAL ENGINEER



Kenneth Lucci, ELECTRICAL ENGINEER



Glen Pace, CIVIL ENGINEER



BIDDING DOCUMENTS
TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS	Number of Pages
00 0101 Project Title Page.....	01
00 0110 Table of Contents.....	03
 DIVISION 01 - GENERAL REQUIREMENTS	
01 7329 Cutting and Patching.....	07
 DIVISION 02 - EXISTING CONDITIONS	
02 4116 Demolition	04
 DIVISION 03 - CONCRETE	
03 1000 Concrete Forming Accessories.....	05
03 2000 Concrete Reinforcing.....	05
03 3000 Cast-In-Place Concrete	17
 DIVISION 05 - METALS	
05 0513 Hot-Dip Galvanizing	06
05 5000 Metal Fabrications	08
 DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES	
06 1000 Rough Carpentry.....	08
 DIVISION 07 - THERMAL AND MOISTURE PROTECTION	
07 2719 Plastic Sheet Air Barriers	05
07 6000 Flashing and Sheet Metal	05
07 9200 Joint Sealants	06
 DIVISION 09 - FINISHES	
09 2423 Cement Plaster and Metal Lath	11
09 2900 Gypsum Board	07
09 3013 Ceramic Tiling	09
09 5113 Acoustical Panel Ceilings.....	08
09 6513 Rubber Base	04
09 6519 Vinyl Composition Tile.....	06
09 9000 Painting and Coating.....	09
 DIVISION 10 - SPECIALTIES	
10 1400 Signage.....	10

210121		
10 2813	Toilet Accessories.....	03

DIVISION 22 – PLUMBING

22 0500	Common Work Results for Plumbing.....	05
22 0505	Trenching and Backfilling for Plumbing Piping.....	06
22 0510	Plumbing Piping	07
22 0523	General-Duty Valves for Plumbing Piping.....	05
22 4000	Plumbing Fixtures and Equipment	06

DIVISION 26 - ELECTRICAL

26 0000	General Provisions.....	11
26 0030	Tests and Identification.....	07
26 0050	Basic Electrical Materials & Methods	06
26 0060	Minor Electrical Demolition for Remodeling.....	03
26 0111	Conduits	06
26 0120	Conductors	04
26 0130	Electrical Boxes	04
26 0140	Wiring Devices	09
26 0142	Nameplates and Warning Signs	02
26 0164	Branch Circuit Panelboards.....	03
26 0170	Disconnects	02
26 0190	Support Devices.....	02
26 2450	Grounding	06
26 2510	Lighting Fixtures.....	03
26 4721	Fire Alarm System.....	34

DIVISION 27 - ELECTRICAL

27 5127	Public Address Assistive Listening Systems	10
---------	--	----

DIVISION 31 – EARTHWORK

31 1000	Site Clearing.....	03
31 2000	Earthwork.....	06
31 2333	Trenching and Backfilling.....	04

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 1123	Aggregate Base Courses.....	02
32 1216	Asphalt Concrete Paving	04
32 1600	Curbs, Gutters, Sidewalks	04
32 1723.13	Painted Pavement Markings	01

210121		
32 8423	Irrigation System	06
32 9020	Lawn Renovation.....	04
32 9030	Landscape Maintenance	03
32 9315	Landscape Planting.....	05
32 9335	Sod Lawn Planting.....	02
32 9340	Decomposed Granite Path.....	02

DIVISION 33 – UTILITIES

33 1000	Water Utilities.....	07
---------	----------------------	----

END OF TABLE OF CONTENTS

SECTION 01 7329
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 01 2973 - Schedule of Values.
- B. Section 01 3113 - Project Coordination.
- C. Section 01 3119 - Project Meetings.
- D. Section 01 3213 - Construction Schedule.
- E. Section 01 3300 - Submittal Procedures.
- F. Section 01 7123 - Field Engineering.
- G. Section 01 7836 - Warranties.
- H. Section 01 4525 - Testing, Adjusting, and Balancing of HVAC.

1.03 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. 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 and DSA prior to proceeding with cutting and patching does not waive ARCHITECT right to later require complete removal and replacement of defective Work.

1.04 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 and DSA 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. Structural decking.
 - h. Stair systems.

- i. Miscellaneous structural metals.
 - j. Exterior curtain-wall construction.
 - k. Equipment supports.
 - l. Piping, ductwork, vessels, and equipment.
 - m. 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 safety.
- 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. Conveying systems.
 - j. Electrical wiring systems.
 - k. 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, 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 unsatisfactory 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. Finished wood flooring.
 - e. Synthetic sports flooring.
 - f. Carpeting.
 - g. HVAC enclosures, cabinets, or covers.
 - h. Ceramic and quarry tile.
 - i. Gypsum board.
 - j. Masonry (exterior and interior where exposed).
 - k. Tack boards.
 - l. Casework.
 - m. Finish carpentry.

1.05 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.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 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 parties 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.

3.02 PREPARATION

- A. Temporary support: Provide adequate temporary support of existing improvements or Work to be cut.
- 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 or fastening of new Work. Utilize wet sand blasting for interior surfaces and for exterior surfaces where necessary to prevent objectionable production of dust.

3.03 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 Sections of Divisions 31, 32, and 33 where cutting and patching requires excavating, backfill, and 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 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 compressive strength of 3,000 psi where installed to repair and match existing improvements, unless noted otherwise.

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 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-inch centers. Provide a 6-inch 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-inch 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.

3.04 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 02 4116

DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work. Includes items such as the following:
1. Protection of existing improvements to remain.
 2. Cleaning existing improvements to remain.
 3. Disconnecting and capping utilities.
 4. Removing debris, waste materials, and equipment.
 5. Removal of items for performance of the Work.
 6. Salvageable items to be retained by the Owner.
- B. Related Requirements:
1. Division 01 - General Requirements.
 6. Division 22 — Plumbing.
 7. Division 23 — HVAC.
 8. Division 26 — Electrical.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating the extent of items and systems to be removed. Indicate items to be salvaged or items to be protected during demolition. Indicate locations of utility terminations and the extent of abandoned lines to be removed. Include details indicating methods and location of utility terminations.

1.03 QUALITY ASSURANCE

- A. Perform the Work of this section by workers skilled in the demolition of buildings and structures. Perform the Work of this section under direct superintendence at all times.
- B. Prior to commencement of Work, schedule a walkthrough with the OAR, to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.

- C. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create least possible inconvenience to the public and facility operations.
- D. Related Standard: ANSI/ASSE A10.6.

1.04 PROJECT CONDITIONS

- A. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.
- B. Repair damage to existing improvements or damage due to excessive demolition.
- C. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.
- D. If conditions are encountered that varies from those indicated, promptly notify the Architect for clarification before proceeding.

PART 2 - PRODUCTS

2.01 HANDLING OF MATERIALS

- A. Items scheduled for salvage by the Owner shall be delivered to a location designated by the OWNER. Items shall be cleaned, packaged and labeled for storage.
- B. Items scheduled for reuse shall be stored on the Project site and protected from damage, theft and other deleterious conditions.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protection:
 - 1. Do not commence demolition until safety partitions, barricades, warning signs and other forms of protection are installed.
 - 2. Provide safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.
- B. If safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the OWNER.

3.02 DEMOLITION

- A. Do not throw or drop materials. Furnish ramps or chutes as required by the Work.
- B. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.

- C. Where openings are cut oversize or in improper locations, replace or repair to required condition.

3.03 CUTTING EXISTING CONCRETE

- A. Cutting of existing concrete shall be performed by skilled workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Do not damage concrete intended to remain.
- B. Extent of cutting of structural concrete shall be as indicated on Drawings. Cutting of non-structural concrete shall be as indicated on Drawings or as reviewed by the Architect or structural engineer. Replace concrete demolished in excess of amounts indicated.
- C. Prior to cutting or coring concrete, determine locations of hidden utilities or other existing improvements and provide necessary measures to protect them from damage.

3.04 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

- A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of the Work. Remove abandoned lines and cap unused portions of existing lines.

3.05 REMOVAL OF OTHER MATERIALS

- A. Masonry: Cut back to joint lines and remove mortar without damaging units to remain. Allow space for repairs to backing where applicable.
- B. Woodwork: Cut or remove to a joint or panel line.
- C. Roofing: Remove as required, including accessory components such as insulation and flashings. At penetrations through existing roofing, trim cut edges back to sound roofing with openings restricted to the minimum size necessary to receive Work.
- D. Sheet Metal: Remove back to joint, lap, or connection. Secure loose and unfastened ends or edges and provide a watertight condition. Re-seal as required.
- E. Glass: Remove broken or damaged glass and clean rebates and stops of glazing channels.
- F. Modular materials such as acoustical ceiling panels, resilient tile, or ceramic tile: Remove to a natural joint without leaving damaged or defective Work where joining new Work. After flooring removal, clean substrates to remove setting materials and adhesives.
- G. Gypsum Board: Remove to a panel joint line on a stud or support line.
- H. Plaster: Saw cut plaster on straight lines, leaving a minimum 2-inch width of firmly attached metal lath for installing new lath and plaster.

- I. Remove existing improvements not specifically indicated or required but necessary to perform Work. Cut to clean lines, allowing for installation of Work.

3.06 PATCHING

- A. Patch or repair materials to remain when damaged by the performance of the Work of this section. Finish material and appearance of patch and/or repair Work shall match existing.

3.07 CLEANING

- A. Clean existing materials to remain with appropriate tools and equipment.
- B. Protect existing improvements during cleaning operations.
- C. Debris shall be dampened by fog water spray prior to transporting by truck.
- D. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.
- E. Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where required. Continuously clean up and remove items as demolition Work progresses.
- F. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 03 1000

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. 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.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 2000: Concrete Reinforcing.
3. Section 03 3000: Cast-In-Place Concrete.

1.02 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.

1.03 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.
- C. Product Data: Submit manufacturer's Product Data for form materials and accessories.

1.04 REGULATORY REQUIREMENTS

- A. California Building Code (CBC), Chapter 19A.
- B. California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 4, Construction Safety Orders, Article 6, Excavations, Sections 1713 and 1717.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Storage shall prevent damage and permit access to materials for inspection and identification.

PART 2 - PRODUCTS

2.01 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 Noxcrete", or equal.
- E. Tube Forms: Sonoco "Seamless Sonotubes," Ceme-Tube, Quik-Tube, or equal, of the type leaving no marks in concrete, one-piece lengths for required heights.
- F. Joist Forms: Code recognized steel or molded plastic types as required.
- G. 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.
- H. 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,," "Combi Form" by North American Plywood Corporation, "Plyform" by Roy O. Martin, "ProForm" by Pacific Wood Laminates, or equal. The material shall be furnished with hard smooth birch face veneers with phenolic resin thermally fused onto panel sides. Edges shall be factory sealed.
- I. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, not leaving metal within 1 1/2-inch of concrete surface.
 - J. 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, "Cast-Off" by Sonneborn/BASF Building Systems or equal. Where form liners are furnished, provide form coatings recommended by form liner manufacturer.
 - K. Form Liner: Rigid or resilient type by L.M. Scofield, Symons, Greenstreak, or equal.
 - L. Void Forms: Manufactured by SureVoid Products, Inc., Sonotube, Void Form International, 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

3.01 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. Forms and their supports shall be designed so that previously placed structures will not be damaged.
- B. Use form coating at all surfaces in contact with concrete.

3.02 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

Edit Note: Edit tolerances indicated below for project specifics.

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.

3.03 ERECTION

- A. 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.
- B. 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.
- C. Chamfers: Provide 3/4 inch by 3/4 inch chamfer strips for all exposed concrete corners and edges unless otherwise indicated.
- D. Reglets and Rebates: As specified in Section 03 3000: Cast-In-Place Concrete.

3.04 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, columns and wall forms shall not be removed in less than five days, floor slabs in less than seven days, beams and girders in less than 15 days, pan forms for joists may be removed after three days, but joist centering shall not be removed until after 15 days, and ramp, landing, steps and floor slabs shall not

be removed in less than seven days. Shoring shall not be removed until member has acquired sufficient strength to support its weight, load upon it, and added load of construction.

- 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 03 3000: Cast-In-Place Concrete.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.06 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 03 2000
CONCRETE REINFORCING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concrete steel reinforcement.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 4523: Testing and Inspection.
3. Section 03 3000: Cast-In-Place Concrete.

1.02 REGULATORY REQUIREMENTS

A. Fabrication and placement of reinforcing shall be in accordance with requirements of CBC, Chapter 19A.

1.03 REFERENCES

A. ASTM International:

1. ASTM A184 - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
3. ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
4. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

B. American Concrete Institute (ACI) Publication:

1. ACI SP-66 – ACI Detailing Manual.
2. ACI 318 – Building Code Requirements for Structural Concrete, as modified by CBC.

C. American Welding Society (AWS):

1. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

1.04 SUBMITTALS

- A. Shop Drawings: Submit steel reinforcement Shop Drawings. Include assembly diagrams, schedule of reinforcement, bending charts and slab and framing plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.
- B. Closeout Submittals: Record exact locations of reinforcing that vary from Contract Documents.

1.05 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 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.
- C. Certification of Welders: Shop and Project site welding shall be performed by welding operators certified by AWS.

1.06 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.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide reinforcing of sizes, gages and lengths indicated, bent to indicated shapes.

2.02 MATERIALS

- A. Steel Reinforcing Bars:
 - 1. ASTM A615, deformed grade 60 or 75 billet steel, as indicated on the drawings.
 - 2. Weldable reinforcing bars shall conform to ASTM A706.
- B. Bars or Rod Mats: ASTM A184.
- C. Welded Wire Fabric for Reinforcement: ASTM A1064.
- D. Tie Wire: ASTM A1064, fully annealed, copper-bearing steel wire, 16 gage minimum.
- E. Chairs, Spacers, Supports, and Other Accessories: Standard manufacture conforming to ACI 315 fabricated from steel wire of required types and sizes. For reinforcement supported from grade, provide properly sized dense precast blocks of concrete.

2.03 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 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

3.01 INSTALLATION

- A. Bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as indicated on reviewed Shop Drawings.
- B. Before installation and just prior to placing concrete, clean reinforcing of loose scale, rust, oil, dirt and any coating that could reduce bond.
- C. Accurately position, install, and secure reinforcing to prevent displacement during the placement of concrete.
- D. 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.
- E. Install and secure reinforcement to maintain required clearance between parallel bars and between bars and forms. Lapped splices shall be installed wherever possible in a manner to provide required clearance between sets of bars. Stagger lapped splices. Dowels and bars extending through construction joints shall be secured in position against displacement before concrete is installed and subsequently cleaned of concrete encrustations while they are still soft.
- F. 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.
- G. Use deformed bars unless otherwise indicated, except for spiral reinforcement.

3.02 CLEAN UP

- 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 03 3000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast-in-place normal weight and lightweight concrete, placement and finishing.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 1000: Concrete Forming and Accessories.
3. Section 03 2000: Concrete Reinforcing.
4. Section 32 1313: Site Concrete Work.

1.02 REFERENCES

A. American Concrete Institute (ACI) Publication:

1. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 – Specifications for Structural Concrete.
3. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
4. ACI 305R - Specification for Hot Weather Concreting.
5. ACI 306.1 – Standard Specification for Cold Weather Concreting.
6. ACI 308R – Guide to External Curing of Concrete.
7. ACI 318 - Building Code Requirements for Structural Concrete, as modified by CBC Sections 1903A and 1905A.

B. American Society for Testing and Materials (ASTM) Standards:

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 C156 – Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid membrane-Forming Curing Compounds for Concrete.
10. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
11. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
12. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
13. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
14. ASTM C289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
15. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
16. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
17. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
18. ASTM C567 - Standard Test Method for Determining Density of Structural Lightweight Concrete.
19. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
20. ASTM C845 - Standard Specification for Expansive Hydraulic Cement

21. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
24. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
25. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
26. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
27. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
28. ASTM D1751 - Standard Test Method for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
29. ASTM D7234 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
30. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
31. ASTM E1155 - Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.
32. 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.
33. ASTM E1745 - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
34. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
35. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

36. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.
37. ASTM F3010 – Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use under Resilient Floor Coverings.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating locations of cast-in-place concrete Work 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 2.02.
 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.
 - a. Water/cement ration for concrete slabs on grade shall be 0.50 maximum.
 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: Submit Samples illustrating concrete finishes and hardeners, minimum 12-inch by 12-inch.
- D. Certificates: Submit 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 by one of the methods in ASTM C33 Appendix XI, Methods for Evaluating Potential for Deleterious Expansion Due to Alkali Reactivity of an Aggregate. . Aggregates deemed to be deleterious or potentially deleterious may be used with the addition of a material that has been shown to prevent harmful expansion in accordance

with Appendix XI of ASTM C33, when approved by the building official, in accordance to CBC Section 1903A5A.

- 5. Curing materials: ASTM C171.
- E. Admixtures: Submit product data for proposed concrete admixtures.

1.04 QUALITY ASSURANCE

- A. 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.
- B. 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.
- C. CONTRACTOR shall assist the testing laboratory in obtaining and handling samples at the project site and at the source of materials.
- D. Continuous batch plant inspection requirement may be waived in accordance with CBC Section 1705A.3.3.1. 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 at the start of work 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 Inspector by a truck driver with load identified thereon. The Inspector 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.
- E. Special Inspections and Tests shall be in accordance with CBC Chapter 17A, Reinforcement and Anchor testing per CBC Section 1910A and Specification Section 01 4523.

1.05 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.

1.06 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.
- B. Hot Weather Requirements: Batching, mixing, delivering and placing of concrete in hot weather shall comply with the applicable requirements of ACI 305R.
- C. Concrete temperature of freshly mixed concrete shall be determined per ASTM C1064.

PART 2 - PRODUCTS

2.01 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, 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 reported per ACI 318, provided that the workability and methods of consolidation are such that the concrete can be placed without honeycombs or voids.
- 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. Admixtures containing ASTM C845 expansive cements shall be compatible with the cement and produce no deleterious effects.
 6. Silica fumes used as an admixture shall conform to ASTM C1240.
- 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.
- G. Curing:
1. 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.
 2. Elevated slabs and slabs on grade may be cured at CONTRACTOR's option with curing and proactive water vapor emission and alkalinity control system. Products shall be approved by OWNER's Office of Environmental Health and Safety.
 - a. VaporSeal 309, by Floor Seal Technology, Inc., or equal.

1)	ASTM C156:	0.39 kg/m ² .
2)	ASTM C309:	Exceeds requirements.
3)	ASTM C1315:	Exceeds requirements.
4)	ACI 308R-01	Compliant.
 - b. Remedial Treatment: Water vapor emission and alkalinity control treatment, MES 100 by Floor Seal Technology, Inc. or equal.

- 1) ASTM E96: <0.1 Perms.
- 2) ASTM D1308: 14pH Resistant.
- 3) ASTM D7234: 500+psi 100% concrete failure.
- 4) ASTM F2170: 100%RH resistant.
- 5) VOC Content: <100 g/L, meets SCAQMD Rule #1113.
- 6) ASTM F3010: Meets Requirements.

c. Self-leveling Compounds: Ardex Engineered Cements, K15, or V1200, Schonox ZM Rapid, US Self Leveler Armstrong, S-194, or equal.

- 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, RS by Mer-Krete Systems, Underlayment 962 by C-Cure, 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.

2.02 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. 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.

PART 3 - EXECUTION

3.01 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 Inspector at least 24 hours before placing concrete; do not place concrete until inspected by the Project Inspector.
- 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.

3.02 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

- 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.

3.03 PREPARATION

- A. For installation of vapor barrier refer to Section 07 2600, Vapor Barriers.
- 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. 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.

3.04 INSTALLATION

- A. Conveying and Placing:
 - 1. Concrete shall be placed only under direct observation of the Project Inspector. Do not place concrete outside of regular working hours, unless the Inspector 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.
 - 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 6 feet.

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 and into corners of forms.
7. Where conditions make consolidation difficult or where reinforcement is congested, batches of mortar containing same proportions of cement, sand, and water as provided in the concrete, shall first be deposited in the forms to a depth of at least one inch.

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.

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. Vertical concrete surfaces shall be finished smooth and free from marks or other surface defects.

3.05 CURING

- A. Length of time, temperature and moisture conditions for curing concrete shall be in accordance with ACI 318, Section 5.11.
- B. 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.
- C. 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.

- D. 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.
- E. When curing slabs with proactive water vapor emission and alkalinity control system:
1. Coordinate and schedule application of curing compound with concrete pour schedule, while conforming to manufacturer's application instructions.
 2. When the surface of the concrete has hardened sufficiently to sustain foot traffic pre-cure slabs with liquefied product application following manufacturer's written instructions. Application shall be by trained applicators.
 3. Monitor Environmental Conditions: Set up weather station 20 to 30 inches above freshly placed concrete. Record temperature, humidity and wind velocity measurements at 15 minute maximum intervals.
 4. Calculate Evaporation Rate: Use recorded weather information in combination with nomograph per ACI 308R, Figure 4.1, Guide to Curing Concrete, to evaluate relevant evaporation rate.
 5. When the bleed water rate of the concrete is approximately equal to the surface water evaporation rate, spray curing compound material throughout surface of slabs and decks, following manufacturer's written instructions. Application shall be by trained applicators.
 6. Perform the following tests at least 28 days after placement of concrete and prior to floor covering installation. Submit to OAR test results indicating locations that do not comply with scheduled flooring installation requirements.
 - a. Calcium chloride testing per ASTM F1869.
 - b. Relative humidity testing per ASTM F2170.
 - c. Alkalinity testing per ASTM F710.
 - d. Perform concrete bond layer humidity meter testing to determine substrate surface acceptability.
 7. Areas emitting moisture and alkalinity at rates exceeding floor covering manufacturer's published ASTM F1869 limits, shall receive a corrective coating, at no cost to the OWNER, as follows:
 - a) Mask and protect adjacent walls and floor surfaces from effects of scarification and application of remedial treatment.
 - b) Scarify slab surface in area of application by shot blasting or other method acceptable to corrective coating manufacturer.

- c) Prepare and fill cracks, control joints and cold joints.
- d) Apply two-component modified epoxy penetrant and coating with roller and squeegee over required treatment area; saturate surfaces to ensure a through mechanical bond.
- e) Clean and fill divots, chips, voids and other surface irregularities with one hundred percent Portland cement based patching compound or cementitious fill.
- f) Apply cementitious surfacing over coating in areas to receive resilient and wood floor coverings to facilitate adhesion; apply to a thickness of 1/8 inch.

3.06 FILLING, LEVELING AND PATCHING

- A. 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.
- B. 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.
- C. 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.

3.07 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.

3.08 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, 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.

3.09 TESTING

- A. Molded Cylinder Tests:
1. Inspector 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 three days, seven days, and 28 days. A strength test shall be the average of the compressive strength of two cylinders, obtained from the same sample of concrete and tested at 28 days or at test age designated for determination of f'_c .
 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.
- B. 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.
- C. Concrete Consistency: Measure consistency according to ASTM C143. Test twice each day or partial day's run of the mixer.
 - D. 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.
 - E. Air Content Testing: Measure in accordance to ASTM C173 or ASTM C231, for each composite sample taken in accordance to ASTM C172.
 - F. 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.
 - G. 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 03 1000 Concrete Forming and Accessories, and reinforced as described in Section 03 2000 Concrete Reinforcing. 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.

3.10 CLEAN UP

- A. 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 0513
HOT-DIP GALVANIZING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Hot-dip galvanizing of structural steel articles.
2. Hot-dip galvanizing of steel railings.
3. Hot-dip galvanizing of fabricated steel assemblies.
4. Hot-dip galvanizing of fencing steel assemblies.
5. Preparation of galvanized steel assemblies for painting.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 05 5000: Metal Fabrications.
3. Section 09 9000: Painting and Coating.

1.02 REFERENCES

A. American Galvanizers Association (AGA):

1. Inspection of Products Hot-dip Galvanized after Fabrication.
2. The Design of Products to be Hot-dip Galvanized after Fabrication.
3. Recommended Details of Galvanized Structures.

B. ASTM International (ASTM):

1. ASTM A123 – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
2. ASTM A143 – Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
3. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

4. ASTM A384 – Standard Practice for Safeguarding Against Warpage and Distortion during Hot-Dip Galvanizing of Steel Assemblies.
5. ASTM A385 – Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
6. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
7. ASTM B6 – Standard Specification for Zinc.
8. ASTM D6386 – Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
9. ASTM D7803 - Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating.
10. ASTM E376 - Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods.

C. The Society for Protective Coatings (SSPC):

1. SSPC-SP1 – Solvent Cleaning.
2. SSPC-SP2 – Hand Tool Cleaning.
3. SSPC-SP3 – Power Tool Cleaning.
4. SSPC-SP5 – White Metal Blast Cleaning.
5. SSPC-SP7 – Brush-Off Blast Cleaning.
6. SSPC-SP10 – Near White Blast Cleaning.
7. SSPC-SP11 – Power Tool Cleaning to Bare Metal.
8. SSPC-SP16 - Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.

1.03 COORDINATION WITH STEEL FABRICATOR

- A. Prior to fabrication, steel fabricators shall submit approved fabrication shop drawings to the galvanizer. The Galvanizer shall review fabricator shop drawings for suitability of materials for galvanizing and coatings and coordinate any required fabrication modifications.
- B. Steel Fabricator shall notify the galvanizer of steel fabrications that exceed the ASTM A385 recommended percentages for carbon, phosphorus, manganese and silicon, so special galvanizing processing techniques are used.
- C. Coordinate with steel fabricator appropriate marking and masking materials.

1.04 QUALITY ASSURANCE

- A. Coating Applicator: Company specializing in hot-dip galvanizing after fabrication following the procedures in the Quality Assurance Manual of the American Galvanizers Association.
- B. Galvanizer shall have an in-plant inspection program designed to maintain the coating thickness, finish, and appearance within the requirements of this Section.

1.05 SUBMITTALS

- A. Galvanizing Certificate of Compliance: Provide notarized Certificate of Compliance with ASTM standards and specifications herein listed. The Certificate shall be signed by the galvanizer and contain a detailed description of the material processed. The Certificate shall include information as to the ASTM standard used for the coating.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Package and handle galvanized material in a manner which will avoid damage to the zinc coating.
- B. Store in dry, well-ventilated conditions until shipping.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel for Galvanizing: As specified in Sections:
 - 1. Section 05 1200: Structural Steel Framing.
 - 2. Section 05 5000: Metal Fabrications.
 - 3. Section 05 5100: Metal Stairs and Railings.
- B. Zinc for Galvanizing: Conform to ASTM B6, as specified in ASTM A123.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Remove welding slag, splatter, anti-splatter compounds and burrs remaining in steel articles.
- B. Provide drainage and venting holes in tubular assemblies. In thicker material drill holes in place of punching. Holes shall have a relatively uniform circumference. Punched holes or burned holes with a plasma torch shall be treated with a drill to even the diameter to appropriate size.

- C. Masking installed by steel fabricator shall remain in place through galvanizing process completion.
- D. Provide lifting lugs to allow for handling during galvanizing. Avoid the use of chains or wires directly connected to steel articles.
- E. Safeguard against warpage or distortion of steel members in accordance with ASTM A384.
- F. Pre-clean steel work in accordance with accepted methods to produce an acceptable surface for quality hot-dip galvanizing. Remove surface contaminants and coatings that are not removable by the normal chemical cleaning process in the galvanizing operation by grit-blasting, sand-blasting, or other mechanical means.
- G. Follow the degreasing, pickling and fluxing steps to remove remaining oxides and to deposit a protective layer on the steel to prevent any further oxides from forming on the surface prior to immersion in the molten zinc.

3.02 COATING APPLICATION

- A. Galvanize steel articles, fabrications and assemblies by the hot-dip process in accordance with ASTM A123. The bath chemistry shall be as specified by ASTM B6, and requires at least 98% pure zinc maintained at approximately 840 F.
- B. Galvanize bolts, nuts, washers and iron and steel hardware components in accordance with ASTM A153.
- C. Safeguard products against steel embrittlement in conformance with ASTM A143.
- D. Once the fabricated items' coating growth is complete, withdraw slowly from the galvanizing bath, and remove the excess zinc by draining, vibrating, and/or centrifuging.
- E. Prepare galvanized products for powder coating in accordance to ASTM D7803. Prepare galvanized products for painting in accordance to ASTM D6386.
- F. Handle articles to be galvanized in such a manner as to avoid mechanical damage and to minimize distortion.
- G. Apply a chromate passivation treatment to fabrications that will not be painted after galvanizing to minimize the wet storage staining which may occur on articles unable to be stored in dry, well-ventilated conditions.

3.03 COATING REQUIREMENTS

- A. Conform to paragraph 6.1 of ASTM A123, or Table 1 of ASTM A153, as applicable.
- B. Surface Finish: Continuous, adherent, as smooth and evenly distributed as possible and free from any defect detrimental to the stated end use of the coated article
- C. Adhesion: Withstand normal handling consistent with the nature and thickness of the coating and normal use of the article.

3.04 TESTS

- A. Inspection and testing of hot-dip galvanized coatings shall be done under the guidelines provided in the AGA publication Inspection of Products Hot-dip Galvanized after Fabrication. Tests and inspections shall be performed immediately after the coating is applied and has cooled to ambient temperature, and before it leaves the galvanizing facility.
- B. Include visual examination and test methods in accordance with ASTM A123, or A153, as applicable, to determine the thickness of the zinc coating on the metal surface.
- C. During the visual inspection, if adhesion concerns are suspected, such as peeling or flaking of the galvanized coating, then adhesion testing using the stout knife method shall be conducted. Embrittlement testing is required when there is evidence of embrittlement and shall be conducted per the requirements of ASTM A143.
- D. Upon completion of tests furnish notarized Certificate of Compliance with ASTM standards and specifications herein listed.

3.05 REPAIR OF DAMAGED COATINGS

- A. Smooth out rough surfaces, bumpy or high spots and icicles by hand filing or power sanding the area without removing any more zinc coating than necessary. Repair damaged galvanized surface with a zinc rich coating.
- B. Repair areas damaged during galvanizing process or handling by one of the approved methods in accordance with ASTM A780 whenever damage exceeds 3/16" in width. Minimum thickness requirements for the repair shall be per ASTM A123, Section 6.2.
- C. Remove lifting lugs and repair coating with a zinc rich coating.
- D. Surface preparation for application of zinc rich coating shall be in accordance to ASTM A780.
 - 1. Clean areas in accordance to SSPC-SP2.
 - 2. Prepare surface for zinc spray in accordance to SSPC-SP5, or zinc rich paint repair in accordance to SSPC-SP10.

3.06 PREPARATION FOR TOP COATING

- A. Galvanized fabrications indicated on the drawings to be painted shall be prepared in accordance to ASTM D6836.
 - 1. Surface cleaning prior to surface preparation in accordance to SSPC-SP1.
 - 2. Removal of zinc high spots and cleaning of light deposits of zinc reaction products in accordance to SSPC-SP2 or SSPC-SP3.

3. Profile surface in accordance to SSPC-SP7 or SSPC-SP11.
- B. Galvanized fabrications indicated on the drawings to be powder coated shall be prepared in accordance to ASTM D7803.
1. Surface cleaning and removal of oil and grease in accordance to SSPC-1.
 2. Surface smoothing and removal of loose particles in accordance to SSPC-SP-2 or SSPC-SP3.
 3. Sweep blasting and surface profiling in accordance to SSPC-SP16.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Metal fabrications:

1. Steel thresholds.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel Gates.
4. Gratings, frames and covers.
5. Steel bollards.
6. Miscellaneous steel framing, supporting angles, plates, brackets, clips, anchors and bolts for equipment, and other work which is not specifically included in Section 05 1200, Structural Steel Framing.
7. Miscellaneous fabrications, as indicated on the Drawings.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 4523: Testing and Inspection.
3. Section 03 3000 – Cast-in-Place Concrete.
4. Section 05 5013: Hot-Dip Galvanizing.

1.02 REFERENCES

A. ASTM International (ASTM):

1. ASTM A27 – Standard Specification for Steel Castings, Carbon, for General Application.
2. ASTM A36 – Standard Specification for Carbon Structural Steel.
3. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
4. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

5. ASTM A123 - Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
6. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
8. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
9. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
10. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
11. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
12. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
13. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
14. ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
15. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
16. ASTM F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

B. American Welding Society (AWS):

1. AWS D1.1 Structural Welding Code - Steel.
2. AWS D1.3 Structural Welding Code - Sheet Steel.
3. AWS D-19.0 Welding Zinc Coated Steel.

1.03 COORDINATION

A. Coordination between Steel Fabricator and Galvanizer:

1. Prior to fabrication, submit approved fabrication shop drawings to the galvanizer.

2. Notify galvanizer of steel fabrications that exceed the ASTM A385 recommended percentages for carbon, phosphorus, manganese and silicon, so special galvanizing processing techniques are used.
- B. Coordinate installation of metal fabrications that are anchored to concrete or masonry, or that receive work specified by other Sections. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
 - C. Field Measurements: Field verify dimensions prior to fabrication.
 - D. Coordinate selection of shop primers with galvanizing, and with paintings to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and paintings are compatible with one another.

1.04 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. Fabricator qualifications per Article "Quality Assurance".
- E. Welding:
 1. Welder's Certificates: Field welders shall be Project certified in accordance with AWS D1.1.
 2. Welding Material Certification: Provide certificate that welding material complies with specifications.
- F. Research/Evaluation Reports: ICC-ES for post-installed anchors.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm with a minimum five year experience in successfully producing metal fabrications similar to that shown on the drawings.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D-1.1– Structural Welding Code – Steel.
 2. AWS D1.3 - Structural Welding Code - Sheet Steel.

- C. Inspection of Welding: Refer to Section 01 4523: Testing and Inspection.
- D. Field applied primers, paintings, sealers and adhesives shall be approved by the OWNER's Office of Environmental Health and Safety (OEHS).
- E. Preassemble items in shop to greatest extent possible to minimize field welding. Mark units for reassembly and coordination of installation. Use marking method compatible with galvanizing.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store miscellaneous metal items above grade on platforms, skids, or other required supports.
- B. Protect from damage and from corrosion, dirt, grease and other foreign matter.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel Shapes: ASTM A36.
- B. Rolled Steel Plates: ASTM A36. Plates to be bent or cold-formed shall conform to ASTM A283, Grade C.
- C. Round HSS: ASTM A500 Grade B or C.
- D. Square and Rectangular HSS: ASTM A500 Grade B or C.
- E. Steel Pipe: ASTM A53 Type E or S, Grade B, standard weight (Schedule 40), unless otherwise noted. Black finish.
- F. Steel Sheet: ASTM A1008 or ASTM A1011.
- G. Steel Bolts: ASTM A307, Grade A, or F3125 with hex steel nuts per ASTM A563 and washers. Galvanized in accordance with ASTM A153 for exterior locations.
- H. Steel Bars: Conforming to ASTM A108 or ASTM A575.
- I. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers, and shims, hot-dip galvanized per ASTM A153.
- J. Nonshrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- K. Concrete Materials:
 - 1. Concrete per Section 03 3000, Cast-in-Place Concrete.

2. Welded wire fabric and reinforcing per section 03 2000, Concrete Reinforcing.

2.02 FABRICATION

A. General:

1. Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces. Mark units for reassembly and installation.
2. Cut, drill, and punch metals cleanly and accurately. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated or specified. Remove sharp and rough areas on exposed surfaces. Form exposed work with accurate angles and surfaces and straight edges. Form exposed connections with hairline joints, flush and smooth. Locate joints where least conspicuous.

B. Welding:

1. Weld connections unless otherwise indicated.
2. Weld corners and seams continuously and in accordance with requirements of AWS D1.1 Structural Welding Code. Welds shall be inspected as required in Section 05 1200: Structural Steel Framing.
3. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

2.03 PREPARATION FOR GALVANIZING

- A. Fabricate to the largest size possible and whenever possible use slip joints to minimize field welding.
- B. Fabricate structural steel in accordance with Class I, II, III guidelines as described in AGA's Recommended Details for Galvanized Structures, to facilitate galvanizing process. Corners of gussets, stiffeners, and bracing shall be cropped to allow free flow of zinc during galvanizing process.
- C. Remove welding slag, splatter, anti-splatter compounds and burrs prior to delivery for galvanizing.
- D. Marking for Identification: Avoid unsuitable marking paints for identification, such as oil based paints and markers and crayon markers. Use water soluble paints or markers acceptable to galvanizer or steel tags wired to the work.
- E. Masking: Use masking materials recommended by the American Galvanizers Association (AGA) to produce ungalvanized areas for field welding and at slip critical bolts.
- F. Galvanize fabrications per Section 05 5013, Hot-Dip Galvanizing, in accordance with ASTM A123 and ASTM A153.

2.04 SHOP FINISH

- A. Metal fabrications shall be provided with a coat of primer, except those indicated to be hot-dip galvanized.
- B. Primers:
 - 1. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
 - 2. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
 - 3. Minimum dry film thickness of primer shall be 2.0 mils.
- C. 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.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas where metal fabrications are to be installed. Notify the OAR in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Provide anchorage devices and fasteners as indicated in the drawings and where necessary for securing miscellaneous metal fabrications to in-place construction.
- B. Cut, drill, and fit as required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of hot-dip galvanized fabrications intended for bolted or screwed field connections.
- D. Alignment: Verify alignment of items with adjacent construction. Coordinate related work.
- E. Grout: Follow manufacturer's recommendations for substrate preparation and application.

- F. Corrosion Protection: Coat concealed surfaces of metals that will come into contact with grout, concrete, masonry, or wood, with a heavy coat of bituminous paint or zinc chromate primer. Protect dissimilar metals from galvanic corrosion by pressure tapes, coating, or isolators.

3.03 FIELD WELDING

- A. Preparation of Weld Area of Galvanized Fabrications: Remove masking from fabrications. Remove remaining zinc coating between one inch and four inches from both sides of members to be welded, by grinding back the zinc coating, burning the zinc away or pushing back the molten zinc from the weld area.
- B. Welding: Comply with AWS Code for procedures of manual shielded metal-arch welding, appearance and quality of welds made, methods used in correcting welding work.
 - 1. Weld in accordance to AWS D-1.1.
 - 2. Weld galvanized fabrications in accordance to AWS D-19.0.
- C. Remove welding flux immediately. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surfaces matches those adjacent.
- D. Upon completion of welding plug vent, drainage and lifting holes of galvanized fabrications with appropriate diameter zinc plugs. Push in about half way by hand, and hammer to a tight fit. With a hand file or an abrasive tool, file away excess material. Repair scratches with a zinc rich coating.
 - 1. Plug railing holes.
 - 2. Plug visible holes of HSS members.

3.04 ADJUSTING AND CLEANING

- 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. Apply two coats of Carbomastic 15, by Carboline or equal product approved by OWNER's OEHS. Brush or roll to a 4 to 6 mil thickness.

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 06 1000
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Rough carpentry Work.

B. Related Requirements:

1. Division 01 - General Requirements.

3. Section 03 1000: Concrete Forming and Accessories.

4. Section 03 3000: Cast-In-Place Concrete.

6. Section 09 2900: Gypsum Board.

1.02 SYSTEM DESCRIPTION

A. Regulatory Requirements:

1. Work of this Section shall comply with CBC Chapter 23A.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Redwood structural and framing lumber shall be graded in accordance with Standard Specifications for Grades of California Redwood Lumber of the Redwood Inspection Service.

2. Douglas fir, larch or hemlock structural and framing lumber shall be graded in accordance with the Standard Grading Rules of the West Coast Lumber Inspection Bureau (WCLIB) or the Western Lumber Grading Rules of the Western Wood Products Association (WWPA).

3. Plywood shall conform to requirements of Product Standard PS 1, and shall be grade marked by a recognized grading agency (APA and PTL).

B. Lumber shall bear official grade mark of the association under whose rules it was graded or official grade mark of another recognized grading agency.

C. Structural and framing members 2-inch thick (nominal) and larger shall be air-dried to moisture content not to exceed 19 percent before installation.

- D. Each piece of preservative treated lumber shall be identified by the Quality Mark of an approved inspection agency in accordance with CBC Chapter 23A; refer to Section 01 4523: Testing and Inspection.
- E. Lumber showing visible signs of mold growth:
 - 1. Lumber showing visible signs of mold growth shall be removed from the project site or cleaned as outlined below.
 - 2. The contractor is responsible for all costs associated with cleaning, post-cleaning testing, and reporting for lumber with mold.
 - a. Lumber that shows visible signs of mold growth prior to, or after installation, shall be cleaned pursuant to USEPA’s guidance publication “Mold Remediation in Schools and Commercial Buildings dated March 2001 (EPA 402-K-01-001).
 - b. A minimum of 10 percent of the total locations cleaned must be sampled (tape lift method) post cleaning to ensure cleaning effort was successful. Cleaning will be considered acceptable when tape lift sample results evaluated by direct microscopic examination determine that the general abundance of mold is non-detect or rare (normal trapping to 1+).
 - c. A report prepared by a Certified Industrial Hygienist (CIH) that details the sampling and cleaning results shall be prepared and submitted to the OWNER for review and approval.
 - d. Cleaned lumber shall not be installed or enclosed by finish materials until approval of test results. Cleaned lumber must meet moisture content requirements as required elsewhere in this specification prior to installation or application of finishes.

1.04 STORAGE, HANDLING AND PROTECTION

- A. The materials supplied as part of the Work of this section shall be protected from exposure to inclement weather before being covered by other Work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber: Structural and framing lumber shall be of following species and grades:

	<u>INSTALLATION</u>	<u>SPECIES</u>	<u>GRADE</u>
1.	Subfloor, wall sheathing, roof sheathing and ceiling furring	Douglas fir and larch	Construction Board, WCLIB; WWPA
2.	Posts, (5-inch by 5-inch and larger,	Douglas fir	No. 1 or better Structural

	width not more than 2 inches greater than thickness).	and larch	Posts and Timbers, WCLIB. No. 1 or better Post and Timbers, WWPA.
3.	Beams, girders and truss members (5-inch and thicker, rectangular, width more than 2-inches greater than thickness) where exposed as finish members.	Douglas fir and larch	No. 1 or better Structural Beams and Stringers, WCLIB; WWPA.
4.	Joists, rafters, lintels, posts, mullions and members (2 to 4-inch thick, 2 to 4-inch wide)	Douglas fir and larch	No. 1 or better; Structural Light Framing, WCLIB;
5.	Other lumber (2 to 4-inch thick, 2 to 4-inch wide) not specified in subparagraph 5 above.	Douglas fir and larch	Construction Light Framing WCLIB; WWPA
6.	Framing lumber (2 to 4-inch thick, 5-inch and wider).	Douglas fir and Larch	No. 1 or better Structural Joists and Planks, WCLIB; WWPA.
7.	Mudsills and plates in contact with earth.	Douglas fir and Larch Treated	Same as subparagraphs 5 and 6.
8.	Sills or plates installed on concrete or masonry surfaces 6 inches or less above earth or finish grade.	Douglas fir and Larch Treated	Same as subparagraphs 5 and 6.
9.	Sills, foundation plates and sleepers installed on concrete, masonry foundations, or installed on concrete slab in direct contact with earth.	Douglas fir and Larch treated	Same as subparagraphs 5 and 6.
10.	Miscellaneous nailing strips and blocks embedded in concrete or masonry.	Douglas fir and Larch treated	Same as subparagraphs 5 and 6.
B.	Plywood: Plywood furnished for structural purposes, when exposed outdoors, shall be exterior type plywood. Other plywood furnished for structural purposes shall be exterior type, or Exposure 1.		
C.	OSB Board or Panels:		
1.	Oriented strand board or panels shall not be furnished as part of the Work of this section.		
D.	Preservative Treated Wood:		

1. Wood and plywood specified; as treated wood shall be pressure treated wood in accordance with CBC requirements.
 2. Seasoning: Treated lumber shall be air seasoned after treatment, for a minimum of two weeks before installation. Moisture content shall be 15 percent maximum.
 3. Creosote or arsenic is not permitted for treating wood.
 4. When treated wood member have been notched, dapped, drilled, or cut, such newly cut surfaces shall be painted with a heavy coat of the same preservative material originally provided for treatment of wood member.
- E. Fire Retardant Protection: Wood and plywood specified as fire retardant protected wood shall be treated by approved methods and materials and shall be dried following treatment to maximum moisture content as follows:
1. Solid sawn lumber 2-inch thick or less: 19 percent.
 2. Plywood: 15 percent.
- F. Plywood Subflooring: Underlayment, Group 1, Exposure 1; of thickness indicated.
- G. Mineral Fiber Panels: Asbestos-free, thickness as indicated.
- H. Adhesive: Tec, Inc. Sturdi-Bond TA-175, Top Industrial Inc., Rainbuster 345, Liquid Nails LN-940, or equal elastomeric adhesive conforming to ASTM D 3498 and APA-AFG-01.

PART 3 - EXECUTION

3.01 FASTENINGS

- A. Nails and Spikes:
1. Furnish only common wire nails or spikes whenever indicated, specified or required.
 2. Whenever necessary to prevent splitting, holes shall be pre-drilled for nails and spikes.
 3. Nails in plywood shall not be overdriven.
 4. Machine Applied Nailing: Use of machine nailing is subject to a satisfactory Project site demonstration for each Project and approval by the Architect or structural engineer retained by the Architect as an Architect Consultant and DSA. Installation is subject to continued satisfactory performance. Machine nailing is not permitted for 5/16 inch plywood. Do not permit nail heads to penetrate outer ply. Maintain minimum allowable edge distances when installing nails.
- B. Lag Screws:

1. When installing lag screws in a wood member, pre-drill hole as required by the CBC.
 2. Lag screws, which bear on wood, shall be fitted with standard steel plate washers under head. Lag screws shall be screwed and not driven into place.
- C. Bolts:
1. Lumber and timber to be fastened together with bolts shall be clamped together with holes for bolts bored true to line.
 2. Bolts shall be fitted with steel plates or standard cut washers under heads and nuts. Bolts shall be tightened when installed and again before completion of the Work of this section.
- D. Wood Screws: When installing wood screws, pre-drill holes as required by the CBC.
- E. Metal Framing Devices: Framing anchors, joist hangers, ties, and other mechanical fastenings shall be galvanized or furnished with a rust inhibitive coating. Nails and fastenings shall be of the type recommended by manufacturer.
- F. Powder Driven Fasteners:
1. Loads shall not exceed 75 pounds unless indicated on the Drawings or when reviewed by the Architect.
 2. The operator, tool, and fastener shall perform the following as observed by the Inspector.
 - a. Observe installation of first 10 fasteners.
 - b. Test the first 10 fasteners by performing a pullout test. Load shall be at least twice the design load, or 150 pounds, whichever is greater.
 - c. Random testing:
 - 1) Load less than 75 pounds - approximately 1 in 10 pins.
 - 2) Load 75 pounds or greater - 1/2 of the pins.
 3. Failure of any test will result in testing of all installed pins.
 4. Nail heads shall not break the outer skin of sheathing.
 5. Non-compliant pins shall be replaced.

3.02 INSTALLATION

A. Stud Walls, Partitions and Furring:

1. Wood stud walls, partitions and vertical furring shall be constructed of members of size and spacing indicated. Provide single treated plate at bottom

and double plate at top unless otherwise indicated. Interior, nonbearing non-shear partitions may be framed with a single top plate, installed to provide overlapping at corners and at intersections with other wall and partitions or by metal ties as detailed.

2. Walls and partitions shall be provided with horizontal staggered blocking at least 2 inch nominal thickness and same width as studs, fitted snugly, and nailed into studs. Blocking shall be installed at mid-height of partition or not more than 7 feet on center vertically. Install wood backing on top of top plate wherever necessary for nailing of lath or gypsum board.
3. Walls, partitions and furred spaces shall be provided with 2-inch nominal thickness wood firestops, same width as space to be firestopped, at ceiling line, mid-height of partition and at floor line. Firestops at floor line are not required when floor is concrete. If width of opening is such that more than one piece of lumber is necessary, provide two thicknesses of one inch nominal material installed with staggered joints.
4. Firestops shall be installed in stud walls and partitions, including furred spaces, so the maximum dimension of any concealed space is not over 10 feet.
5. Corners, and where wood stud walls and wood vertical furring meet, shall be constructed of triple studs. Openings in stud walls and partitions shall be provided with headers as indicated and a minimum of 2 studs at jambs, one stud of which may be cut to support header in bearing.
6. Where wood and masonry or concrete walls intersect, end stud shall be fastened at top, bottom and mid-height with one 1/2 inch diameter bolt through stud and embedded in masonry or concrete a minimum of 4 inches. Bolts shall be provided with washers under nuts.
7. Sills under bearing, exterior or shear walls shall be bolted to concrete with 5/8 inch diameter by 12-inch long bolts with nuts and washers, spaced not more than 4 feet on center unless noted otherwise. There shall be a bolt within 9 inches of each end of each piece of sill plate. Sills shall be installed and leveled with shims, washers, with nuts tightened to level bearing. Space between sill and concrete shall be dry packed with cement grout.

B. Floor Joists, Roof and Ceiling Framing:

1. Wood joists shall be of the size and spacing indicated, installed with crown edge up, and shall have at least 4-inch bearing at supports. Provide 2-inch solid blocking, cut in between joists, same depth as joists, at ends and bearings, unless otherwise indicated.
2. Floor joists of more than 4 inches in depth and roof joists of more than 8 inches in depth shall be provided with bridging. Floor joists shall be bridged every 8 feet with solid blocking or metal cross bridging. Roof joists shall be bridged every 10 feet.
3. Joists under and parallel to bearing partitions shall be doubled and nailed or bolted together as detailed. Whenever a partition containing piping runs

parallel to floor joists, joists underneath shall be doubled and spaced to permit passage of pipes and blocked with solid blocking spaced at not more than 4 feet intervals.

4. Trimmer and header joists shall be doubled, when span of header exceeds 4 feet. Ends of header joists more than 6 feet long shall be supported by framing anchors or joist hangers unless bearing on a beam, partition, or wall. Tail joists over 12 feet long shall be supported at header by framing anchors or on ledger strips at least 2 by 4.
5. Provide solid blocking between rafters and ceiling joists over partitions and at end supports where indicated.

C. Beams, Girders and Joists:

1. Ends of wood beams, girders and joists which are 2 feet or less above finished outside grade and which abut, but do not enter concrete or masonry walls, as well as wood blocking used in connection with ends of those members shall be treated with wood preservative.
2. Where wood beams, girders and joists enter masonry or concrete walls 2 feet or less above outside wall, metal wall boxes or equivalent moisture barriers shall be provided between wood and masonry or concrete.

G. Furring:

1. Rafters or ceiling joists indicated to be furred for support of materials other than acoustical tile shall be furred with 2 by 4 wood members installed at right angles to supports, spaced as indicated and nailed in place. Furring shall be aligned, and bottoms shall be leveled by installing wood shims as required, and nailed as indicated.
2. Furring for protective wall padding in gymnasium shall be 1 by 3 Douglas fir, Construction Boards, S1S1E; applied horizontally to concrete walls at top and bottom of padding panels; and at uniform intermediate spacing not more than 18 inches on center. Stripping shall be shimmed where required, aligned to a true plane, and secured to concrete walls with concrete nails at not more than 18 inches on center.

H. Furring: Where metal furring is not indicated or specified, provide wood furring at points indicated and required for concealing conduit, piping, structural framing or other unfinished materials. Wood furring shall be 2-by studs of required width. Vertical members contacting concrete or masonry shall be attached as specified for anchoring interior wood stud partitions.

I. Grounds:

1. Provide and set wood grounds at points where wood trim occurs and work is to be plastered. Grounds at 3/4 inch metal lath shall be 5/8 inch thick, net, 1 1/2-inch wide Douglas Fir, S1S. Grounds shall be doubled where trim member exceeds 5-inch width, or wherever indicated. Grounds shall be applied after lath has been installed set plumb, level and true to line.

2. Apply grounds over wood framed surfaces and lath and securely nail to wood backing at each stud or bearing. Grounds applied over steel channel studs and lath shall be securely nailed at each stud or bearing to nail-blocks provided and installed in metal studs.
3. Grounds applied to concrete surfaces shall be securely nailed to woodblocks provided and built into concrete.

J. Nailing Strips and Plates:

1. Provide wood nailing strips, plates and blocking indicated or required. Nailing strips in connection with metal work shall be bolted to metal. Wood nailing blocks for securing grounds shall be built into concrete, or masonry.
2. Nailing schedule shall comply with CBC requirements.
3. Treated wood nailing strips for lightweight insulated concrete roof decks at eaves, ridges, rakes, base of curbs and wherever else indicated, shall be provided and installed. Strips shall be treated Douglas fir, 4 inches (nominal) width by thickness of insulated concrete.

K. Wood Backing: Provide wood backing as indicated and as required to receive plumbing, electrical fixtures and equipment, cabinets, door stop plates and other fixed equipment.

L. Wood Bucks: Furnish and set wood bucks to form openings for doors and other openings in concrete or masonry walls and in steel stud or channel partitions and furring. Bucks shall be Douglas fir, S1S2E, 2 inches (nominal) thickness and of width indicated or required. Bucks in connection with concrete shall be bolted thereto, and bucks in masonry walls shall be attached by means of strap anchors embedded in masonry joints. Bucks in connection with steel studs and metal channels shall be secured with nails or screws spaced not to exceed 24 inches on centers.

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 07 2719
PLASTIC SHEET AIR BARRIERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Mechanically attached permeable flexible plastic sheet air barriers.
2. Flexible flashing of openings, penetrations, joints, and terminations of exterior walls and taping of seams.

B. Related Requirements:

1. Section 06 1000 - Rough Carpentry.
2. Section 07 6000 – Flashing and Sheet Metal.
3. Section 07 9200 – Joint Sealants.
4. Section 09 2423 – Cement Plaster and Metal Lath.

1.02 REFERENCES

A. ASTM International:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E1677 - Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls.
3. ASTM E2178 – Standard Test Method for Air Permeance of Building Materials.

B. International Code Council (ICC):

1. ICC-ES Evaluation Reports.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each material and component proposed for installation.

B. Shop Drawings: Dimensioned plans and elevations indicating:

1. Complete information as to size and location of openings, sleeves, conduits, ducts, boxes, inserts, attachments, and structural interferences.
 2. Layout of air barrier showing sheet lapping, cutting, flashing and taping, with references to enlarged details.
- C. Installation Instructions: Submit detailed manufacturer's installation instructions.
- D. Material Samples: Submit minimum 8-1/2-inch by 11-inch samples of air barrier, and 12 inch long flashing.
- E. Test Reports: Submit Test Reports showing performance characteristics equaling or exceeding those specified.
- F. Evaluation Reports: Submit ICC-ES Evaluation Report demonstrating conformance of plastic sheet air barrier to CBC 1404.2, for use as water-resistive barrier.
- G. Qualification Statements:
1. Installer: Statement from plastic sheet air barrier manufacturer indicating installer is approved, certified, or has been trained for the installation of their products.

1.04 QUALITY ASSURANCE

- A. Manufacturer:
1. Plastic sheet air barrier components and accessories shall be from a single source.
 2. Manufacturer shall have a minimum of five years of continued experience in the manufacture of the specified products.
- B. Installer:
1. Minimum five years in the installation of air/weather barriers.
 2. Trained or certified by manufacturer for the installation of their products.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in undamaged and original packaging.
- B. Store materials in a clean, dry, protected location and within temperature range required by plastic sheet air barrier manufacturer. Protect stored materials from direct sunlight.
- C. Handle materials in accordance with Manufacturer's recommendations.

1.06 WARRANTY

- A. Provide a ten year manufacturer's standard material warranty for replacement of plastic sheet air barriers that fail due to material defects.
- B. Installation Warranty: Provide a two year installation warranty for the plastic sheet air barrier, including accessories, against loss of water-tight seal and loss of attachment.
- C. Warranty shall start on the day of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Manufacturer and Products:
 - 1. DuPont (E. I. du Pont de Nemours and Company): Tyvek CommercialWrap.
 - 2. Polymer Group Inc., TyparMetroWrap.
 - 3. Equal.
- B. Properties:
 - 1. Plastic sheet air barrier shall be Type I in accordance to ASTM E1677.
 - 2. Air Permeance: shall not exceed 0.004 cfm/ft², under a pressure differential of 0.3 in w.g. (1.57 psf) (0.02 L/m² at 75 Pa), when tested in accordance with ASTM E2178.
 - 3. Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance to ASTM E84.

2.02 MISCELLANEOUS MATERIALS

- A. Flashing: Self-adhesive butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
 - 1. DuPont (E. I. du Pont de Nemours and Company); FlexWrap and StraightFlash.
 - 2. Polymer Group Inc.; Flashing Flex and Flashing AT.
 - 3. Equal.
- B. Fasteners: Manufacturer approved fasteners.
- C. Tape: Three inch wide seam tape. Pressure-sensitive plastic tape recommended by air barrier manufacturer for sealing joints and penetrations in air barrier.
- D. Sealants and Adhesive Primers: Compatible with plastic sheet air barrier and flashings system.

1. Sealant: Dow Corning 732.
2. Spray Adhesive: Design Polymerics DP77.
3. Equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas and conditions under which plastic sheet air barrier will be installed.
- B. Verify that substrate to receive air barrier has been completed and inspected before commencement of work.
- C. For the installation of flashing and tape, surface shall be smooth, clean, dry and free from voids, loose substrate, protrusions, or any material that would hinder adhesion.

3.02 INSTALLATION

- A. Install plastic sheet air barrier in accordance to manufacturer's installation guidelines, providing continuity throughout exterior walls. Install plastic sheet air barrier with drainage plane surface pattern in vertical position for proper drainage.
- B. Install plastic sheet air barrier starting from the bottom of the building up to ensure proper overlapping of vertical and horizontal seams. Upper layer of plastic sheet air barrier shall overlap bottom layer by a minimum of six inches. Plastic sheet air barrier shall extend over the weep screed by two inches and be taped down.
- C. Secure plastic sheet air barrier by fastening into studs at 12 to 18 inches on center vertically.
- D. Unroll plastic sheet air barrier directly over windows and doors rough openings. Do not install fasteners within six inches of the sills and jambs of the openings and within nine inches of the header, plastic sheet air barrier shall be fastened at these locations during flashing installation.
- E. Horizontal joints shall be overlapped a minimum of six inches with upper courses overlapping lower courses in water-shedding fashion. Vertical seams shall be overlapped a minimum of six inches. Overlap corners of building a minimum of 12 inches.
- F. Tape vertical and horizontal seams using adhesive tape recommended by manufacturer. Seal tears and cuts with adhesive tape as recommended by manufacturer.
- G. Place patch or strip of self-adhered flashing over plastic sheet air barrier where base plates, metal channels, z-girts, or other hardware will be installed.

3.03 FLASHING

- A. Cut air barrier from door and window openings along jambs and sill. Cut a header flap at 45 degree angle to expose eight inches of plastic sheet air barrier to allow for head flashing installation. Install sill flashing per manufacturer instructions, overlapping up the jambs a minimum of six inches on each side.
- B. Wrap flashing around interior jamb, wall face and exterior jamb, overlapping the vertical portion of the sill flashing by at least two inches.
- C. Adhere flashing to the head following manufacturer's instructions. Flashing shall wrap jamb flashings by a minimum of two inches.
- D. Flash piping, conduit, duct and similar penetrations through walls, and flashing ledgers and sills as recommended by manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's technical representative shall inspect the work and submit a statement indicating that the installation has been done in conformance to manufacturer's installation instructions.

3.05 CLEANING

- A. Remove rubbish, debris, and waste material 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 07 6000
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

A. 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 Divisions 22, Plumbing, 23, HVAC, or 26, Electrical.
4. Coping caps.
5. Gutters and downspouts.
6. Conductor heads.
7. Drip flashings.
8. Roof pipe flashings.
9. Other sheet metal items not necessarily specified herein or in other sections but required to prevent penetration of water into building.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 05 3000 – Metal Decking.
3. Section 07 2200 - Roof and Deck Insulation.
4. Section 07 4000 - Roofing and Siding Panels.
5. Section 07 5419 - Polyvinyl-Chloride Roofing
6. Section 07 7100 - Roof Specialties.
7. Section 07 9200 - Joint Sealants.
8. Section 08 6223 – Tubular Daylighting Devices.
9. Section 09 2423 - Cement Plaster and Metal Lath
10. Division 22 – Plumbing.
11. Division 23 - HVAC.
12. 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 A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 2. ASTM A653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 3. ASTM B370 - Copper Sheet and Strip for Building Construction.
- C. Pre-installation Meetings: Refer to Division 07 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 or otherwise damaged materials.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Galvanized Sheet Steel: ASTM A653, coating designation G90, hot-dip galvanized.
- B. Copper Plate, Sheet and Strip: ASTM B370, cold-rolled, tempered. Copper sheet and strip shall be cold-rolled-temper.
- C. Stainless Steel: Plate, sheet and strip shall conform to ASTM A167, 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.
- D. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 1. As-Milled Finish: Mill.
- 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, and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.
- G. Solder: ASTM B32, Grade 5A, composed of 95-5 tin-antimony. Name of product manufacturer and grade designation shall be labeled, stamped or cast onto each coil or 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 ½ 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. Fill joint completely with solder. 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. Maximum length of gutter shall be 40 feet between end or expansion joints unless the system is specially designed to accommodate the greater expansion, the larger flow and the need for special supports. Drain gutter towards nearest downspout and provide an expansion joint at mid-point between downspout outlets, but not to exceed 40 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 ½-inch on center and ½ inch from the edge of the metal, consisting of 3-inch overlap. 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 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 shall be constructed with conductor heads every 40 feet to admit air and prevent vacuum. Keep downspouts offsets to a

maximum of 10 feet. 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 inside diameter of the downspout and extend into downspout 4 inches. Install a removable wire "bulb type" strainer to outlet opening. Strainer shall be fabricated of 22 gage galvanized steel and 1/2 inch hardware cloth.
- C. Conductor Heads: 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
 - D. Reglet Type Counterflashing: Where roof comes in contact with vertical surfaces, provide counterflashing. Set top of counter flashing 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 counter flashing 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.
 - E. 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.
 - F. Roof Pipe Flashings:
 1. PVC roofs: provide PVC flashings or prefabricated welded or seamless flashings.
 2. Tile and built up roofs: provide 24 gage galvanized steel flashings with a storm collar.

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 two 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 09 2423.
- 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 by 2-inch pan head screws.

2. Install 1/4 inch galvanized wire mesh continuous cover on gutter.
 3. Secure downspouts to walls with 1/8 inch by 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 and 1 inch from the bottom of downspout grade. 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 diameter by 2 1/2-inch long 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. Seal laps watertight.
- 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.

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.

OF SECTION END

SECTION 07 9200

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Joint sealants.
 - 2. Preparation for application of sealants.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 07 6000 - Flashing and Sheet Metal.
 - 6. Division 09 - Finishes.
 - 7. Section 10 2813 - Toilet Accessories.

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 inches long, including joint preparation, backing, sealant and tooling. Allow backing to extend 6 inches beyond end of sealant for inspection of substrate.
- F. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C794 for each substrate.

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 five consecutive years; and can show evidence of satisfactory completion of five projects of similar size and scope.

Installer shall have applicators trained and approved by manufacturer for performing this Work.

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: five year material warranty.
B. Installer: two year installation/application 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 C834, Type S, Grade NS, formulated to be paintable.
 - a. Tremco Inc., Acrylic Latex Caulk.
 - b. Pecora Corporation, AC-20.
 - c. Equal.
 2. Sealant 2: Butyl sealant, one-part, non-sag, solvent-release-curing sealant complying with ASTM C1311, gun grade and formulated with a minimum of 75 percent solids.
 - a. Tremco Inc., Tremco Butyl Sealant.
 - b. Pecora Corp., BC-158.
 - c. Equal.

3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C920, 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.
 - e. Equal.
 4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C920, 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. Equal.
 5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Sika Corporation, Sikaflex -221e.
 - b. Equal.
 6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C920, Type M, Grade P, Class 25.
 - a. Sika Corporation, Sikaflex 2C NS/SL.
 - b. Equal.
 7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D217.
 - a. Pecora Corp., BA-98 Acoustical Sealant.
 - b. Equal.
- B. Joint Backing: ASTM D1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.
- C. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.

- E. 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 sealing Work. Where necessary, degrease with a 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 sealed 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 C804 for solvent release sealants, and ASTM C962 for elastomeric sealants.
- F. Protect elements surrounding Work of this section from damage or disfiguration.

3.03 SEALANT APPLICATION SCHEDULE

	<u>Location</u>	<u>Type</u>	<u>Color</u>
A.	Exterior and Interior joints in horizontal surfaces of concrete; between metal and concrete masonry and mortar.	Sealant 6	To match adjacent material
B.	Exterior door, entrance and window frames. Exterior and interior vertical joints in concrete and masonry metal flashing.	Sealant 3 or 5	To match adjacent material
C.	Joints within glazed curtain wall	Sealant 3	Translucent or

	system. Skylight framing system. Aluminum entrance system glass and glazing.		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	To Match 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 09 2423

CEMENT PLASTER AND METAL LATH

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lath and Portland cement plaster and stucco.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 3000 – Cast-in-Place Concrete.
3. Section 06 1000 - Rough Carpentry.
4. Section 07 2719 – Plastic Sheet Air Barriers.

1.02 SYSTEM DESCRIPTION

- A. Three coat 7/8" cement plaster with fiberglass reinforcing mesh on metal lath over water resistive barrier over plastic sheet air barrier.

1.03 REFERENCES

A. ASTM International (ASTM):

1. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. ASTM A510 - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel.
3. ASTM A641 – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
4. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. ASTM C150 – Standard Specification for Portland Cement.
6. ASTM C206 – Standard Specification for Finishing Hydrated Lime.
7. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring.

8. ASTM C847 - Standard Specification for Metal Lath.
9. ASTM C897 – Standard Specification for Aggregate for Job Mixed Portland Cement-Based Plasters.
10. ASTM C926 – Standard Specification for Application of Portland Cement-Based Plaster.
11. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
12. 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 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
13. 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.
14. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
15. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.
16. ASTM E1190 – Standard Test Methods for Power-Actuated Fasteners Installed in Structural members.

B. Federal Specifications (FS):

1. FS FF-N-105: Nails, Brads, Staples and Spikes: Wire, Cut and Wrought.
2. UU-B-790A: Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent, and Fire Resistant).

C. International Code Council (ICC):

1. ICC-ES AC11: Acceptance Criteria for Cementitious Exterior Wall Coatings.
2. ICC-ES AC 191: Acceptance Criteria for Metal Plaster Bases (Lath).

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each material and component proposed for installation.
- B. Certificates: Submit test reports or ICC Evaluation Reports indicating that materials are in compliance with CBC requirements. Cementitious materials shall meet the acceptance requirements of ICC AC11, and metal lath the acceptance requirements of ICC AC191.

1.05 QUALITY ASSURANCE

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store weather sensitive materials under cover, off the ground, and kept in a dry condition until ready for use.
- B. Deliver materials to the Project site in manufacturer's sealed and labeled packages.

PART 2 - PRODUCTS

2.01 METAL LATH AND WEATHER RESISTIVE BACKING

A. Metal Lath:

- 1. Walls and Ceilings: Diamond mesh expanded metal lath, in conformance to ASTM C847, without paper backing. 3.4 pounds per square yard, hot-dip galvanized coating G60 in accordance with ASTM A653. Alabama Metal Industries Corporation (AMICO), California Expanded Metal Products Company (CEMCO), ClarkDietrich, Marino-Ware, or equal.
 - a. 3.4 Expanded Metal Lath V-grooved self-furring type for installation over sheathing. Lath shall be furred out a minimum of 1/4 inch when installed over a solid surface in accordance to DSAIR 25-4.
 - b. Flat type for installation over spaced framing.
- 2. Walls: Self-furring Welded Wire Lath: Weight 1.95 pounds per square yard, with Class 1 galvanized coating in conformance to ASTM A641. Structa Mega Lath per ICC ESR-2017, as manufactured by Structa Wire Corp, or equal.

B. Water Resistive Barrier Backing for Metal Lath:

- 1. One layer of air barrier membrane per Section 07 2719, Plastic Sheet Air Barriers.
- 2. One layer of asphalt saturated, water resistant Kraft paper backing conforming to Fed Spec UU-B-790A and ASTM E2556 Type II, manufactured by Fortifiber, Davis Wire, Leather back, or equal. Furnish for exterior plastering (except on soffits and ceilings), and for mortar-set ceramic wall tile.

C. Self-Adhered Flashing:

- 1. Compatible with the Plastic Sheet Air Barrier, minimum 25 mils thick, self-sealing and waterproof.
- 2. Adhesives, primers and sealers for self-adhered flashings and water repellent backing shall be as recommended by manufacturer for installation with specified products.

2.02 METAL LATH ACCESSORIES

- A. Materials: 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.
- B. Manufacturers: Alabama Metal Industries Corporation (AMICO), California Expanded Metal Products Company (CEMCO), ClarkDietrich, Stockton Products, Marino-Ware, equal.
- C. Products:
 - 1. Exterior Stress Relief Joints: Sizes and profiles, indicated or required. Control joints shall have expanded wings when attachment flange is installed above the primary water-resistant barrier.
 - 2. Expansion Joints: Two piece sections designed to accommodate expansion, contraction and shear forces. Industry generic name: M-Slide Expansion Joint 2 piece joint.
 - 3. Control Joints: One-piece sections, with flange designed to engage plaster. Grounds shall provide full 7/8 inch thickness of cement plaster. Industry generic name: XJ-15.
 - 4. Soffit Drip Screed: Similar to Stockton Products No. 5, with key holes.
 - 5. Casing Beads: Expanded or standard flange type with 7/8 inch grounds to establish plaster thickness. Industry generic names: J-Mold or # 66.
 - 6. Welded Wire Corner Reinforcement: 2-5/8 inch wire wings square or bullnose. Industry generic name: CornerAid.
 - 7. Inner Corner Reinforcement: Shaped reinforcing expanded metal with 3 inch legs, for angle reinforcement. Industry generic name: Cornerite.
 - 8. Lath Reinforcement: Flat expanded metal lath reinforcing units. Industry generic name: Striplath.
 - 9. Outside Corner Reinforcing: 2 1/2" legs Class 1 Galvanized Coating complying with ASTM A641. VTruss Straight Corner per ICC ESR-2017, as manufactured by Structa Wire Corp, or equal.
 - 10. Ventilating Screeds: Soffit, attic, fascia, edge, channel and expansion channel vent screeds, perforated web type, with integral plaster grounds, of sizes indicated on drawings.
 - 11. Foundation Weep Screeds: Integral plaster ground and weep screed; 3-1/2" minimum attachment flange. Industry generic name: #7 Weep Screed.
 - 12. Foundation Casing at Walls with Continuous Insulation: Custom shaped galvanized steel "J" mold with weep holes. Width shall be sized to accommodate insulation thickness plus 7/8 inch plaster.

2.03 LATH FASTENERS

- A. Fasteners through Continuous Insulation: Fastener spacing shall be 8" on center vertically at each stud.
 - 1. Metal Studs: Corrosion resistant coated wafer head steel #10 screws with length that penetrates framing steel thickness plus three threads minimum.
- B. Fasteners at Locations with no Continuous Insulation:
 - 1. Metal Studs: Wafer head type S or S-12, corrosion resistant, with length to penetrate framing steel thickness plus three threads minimum.
 - a. Screws for fastening to steel members from 0.033 inch to 0.112 inch in thickness shall be in accordance to ASTM C954.
 - b. Screws for fastening to steel members 0.033 inch in thickness and less shall be in accordance to ASTM C1002.
- C. Fasteners for Concrete and CMU Substrates: Power Actuated Fasteners: For attachment of lath to concrete and concrete masonry, recommended by manufacturer for the specific use intended. Minimum 3/4 inch long hardened drive style pin with a 1/2 inch diameter style washer. Fasteners shall be corrosion resistant and provide minimum withdrawal resistance of 50 pounds minimum.
- D. Wire: Wire for fastening lath to supports, tying ends and edges of lath sheets, and securing accessories to lath, 0.0475 inch diameter (# 18 wire). Galvanized soft-annealed steel wire in conformance to ASTM A641.

2.04 PLASTER MATERIALS

- A. Factory Blended Portland Cement Plaster Basecoats and Finish: Products as fabricated by California Stucco, La Habra, Parex, Shamrock Stucco, Merlex, Omega Stucco, Inc., Expo Stucco, Spec Mix, Quikrete, CTS, Sika, or other manufacturer member of the Stucco Manufacturer's Association (SMA).
 - 1. Material Standards: Shall conform to ASTM C920.
 - 2. Three Coat Systems:
 - a. Scratch and Brown Coats: Factory blended fiber reinforced plaster and sand mix conforming to ASTM C926, and requiring only the addition of water. Total thickness of coats: 3/4 inch.
 - b. Finish Coat: Factory blended cementitious stucco color coat, integrally colored with fade-resistant pigments. Coat thickness 1/8 inch.
 - 1) Finish: **Light Sand**
 - 2) Color: As selected by ARCHITECT.
 - 3. Crack Isolation System:

- a. Fiberglass Reinforcing Mesh (Lamina): 4.5 oz. Mesh, alkali resistant, compatible with plaster finish.
 - b. Base Coat: Polymer cement base/skim coat, compatible with plaster finish.
- B. Water: Clean, potable and from domestic source.
 - C. Plaster Bonding Agent: In conformance to ASTM C932 and formulated for exterior use. "Weld-Crete", manufactured by Larsen Products Co., or equal.
 - D. Bonding Agent: 100% acrylic emulsion additive, Parex USA Adacryl Admix & Bonder or equal.
 - E. Flashing: Single ply self-adhesive waterproofing membrane as manufactured by W.R. Grace Company, Jiffy-Seal by Protecto Wrap, W.R. Meadows, Inc., 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.
 - F. Miscellaneous Materials: Provide additional components and materials required for a complete installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that installation of plastic sheet air barrier and flashings, per Section 07 2719, and continuous insulation per Section 07 2100 are complete before starting Work of this Section.

3.02 INSTALLATION-OF WATER RESISTIVE BARRIER

- A. Install one layer of water resistant barrier over air barrier. Install Kraft paper horizontally with each course weather lapped 2 inches over layer below and 6 inches on ends.
- B. Repair and seal tears and holes in water resistive barrier prior to installing lath.
- C. Install single ply self-adhesive flashing per manufacturer's recommendations in areas indicated on the Drawings and at locations where the plaster will be in less than a 60 degree plane or where water can pond, with a six inches extension onto the vertical wall surface. Apply self-adhesive flashing in a "shingle fashion".

3.03 INSTALLATION OF LATH AND LATH ACCESSORIES

- A. Exterior Lathing, General: Install in conformance to ASTM C1063 and CBC Chapter 25.

- B. Install longest length of metal lath as possible. Do not use pieces shorter than six feet in length. Attach lath to framing supports not more than seven (7) inches apart along framing supports only.
- C. Apply metal lath with long dimension at right angles to framing or furring supports and lap lath a minimum 1/2 inch at sides and minimum 1 inch on ends. Lap wire lath minimum one mesh on sides and ends. Stagger vertical laps at least 16 inches. Lath shall lap flanges of solid flanged trim accessories by a minimum of 50%.
- D. 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.
- E. Install trim accessories plumb, level and straight, attachments should not exceed 24 inches on center.
- F. Lath shall not be continuous through control joints. Two-piece Expansion Joints shall have the lath cut, be attached to framing and lath lap the flanges. Place control joints as indicated on elevations. Water resistant barrier shall be continuous behind all control joints and vertical reveals.
- G. Install a weep screed at or below foundation plate line on exterior stud walls in conformance to CBC section 2512. Screed 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.
- H. Powder Actuated Fasteners shall be used on concrete/masonry substrates when lath is applied. Fasteners shall be driven home and avoid spalling of concrete. Pattern shall simulate that of framed walls.
- I. Interior Lathing, General: Install in conformance to ASTM C841 and CBC Chapter 25.
- J. Metal lath shall be fastened to metal supports with specified fastener spaced not more than 6 inches apart or with other recognized fasteners.

3.05 PLASTER APPLICATION - GENERAL

- A. Verify that installation of lath is complete prior to start plastering. Notify the Project Inspector upon completion of lath and prior to start of plaster to schedule a lathing installation compliance meeting.
- B. Proportion, mix, apply, and cure plaster in conformance with ASTM C926 and CBC Chapter 25.
- C. 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.

- D. 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, or OEHS approved equal are permitted.
- E. 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.

3.06 EXTERIOR PLASTERING

- A. Concrete surfaces, except where noted as "Exposed Concrete" or "Painted Concrete," shall be finished with stucco **light sand** finish coats, as specified.
- B. Preparation of Concrete and Masonry 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 or as required to control suction.
 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. 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 re-temper. Add only enough water to allow proper application of cement plaster.
- D. Application:
 1. **Sand Bond Coat:** on concrete or masonry surfaces, leave undisturbed, and maintain damp for at least 24 hours following installation. Dash bond coat may be omitted 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 1/4 inch tolerance in 5 feet of surface and consolidate surface with a wood or neoprene float. Surface shall be left open and course, suitable to receive finish coat.

4. Stucco Finish Coat: Install in two 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 finish coat shall be installed adequately to cover surface and fill minor imperfection in the brown coat.
 - 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.
 - e. Provide smoothed plaster finish to comply with ADA requirements behind handrails.
- E. Curing Exterior Plaster: Adhere to current edition of CBC for curing requirements.
- F. Option for Machine Application, Scratch and Brown Coats: 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 or factory installed blow-off valve and required safety devices. Hoses and connections shall be tight and pressure shall be maintained constant.
 3. 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.
 4. Follow-Up: Perform scoring operation of plaster, based on settings and drying conditions at time of installation. Curing shall be as previously specified.
 5. Protection: Before installing any plaster, thoroughly protect other adjacent Work.

3.08 QUALITY CONTROL

- A. Finish interior and exterior plaster to a uniform texture, free of imperfections and flat within 1/4 inch in 5 feet. Form a suitable foundation for paint and other finishing materials. Avoid joining marks in finish coats.

3.09 REPAIR OF 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 three parts masonry or 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.

3.10 CLEANING

- A. Remove rubbish, debris, and waste material 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 09 2900

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Gypsum board wall and ceiling systems.
 - 2. Cement Tile Backer Board.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 06 1000 - Rough Carpentry.
 - 3. Section 07 9200 - Joint Sealants.
 - 4. 09 9000 Painting Coating.

1.02 PROJECT REQUIREMENTS

- 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. Product Data: Submit manufacturer's catalog data for each product proposed for installation.

1.04 QUALITY ASSURANCE

- A. Comply with following as a minimum requirement:
 - 1. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for finishing Gypsum Board.
 - 2. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
 - 3. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.

4. 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.
 5. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 6. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
 7. ASTM C1396 - Standard Specification for Gypsum Board.
 8. ASTM C1629 - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
 9. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 10. 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.
 11. Underwriters Laboratories (ULI) requirements and listings for fire-rated materials and products classification.
 12. 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.
 13. GA 600 - Gypsum wallboard shall conform to requirements of GA 600 Fire Resistance Design Manual, published by the Gypsum Association.
 14. American National Standards for the Installation of Ceramic Tile.
 15. ANSI A118.9 - Specification for Cementitious Backer Units.
- B. Qualifications: Installer shall have a minimum 5 years experience in installing and finishing gypsum board.

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.
- B. National Gypsum Co.
- C. U.S. Gypsum Co.
- D. Or equal.

2.02 MATERIALS

- A. Gypsum Board Type X (fire-resistant) or Type C or Type ULIX as required by fire rated design and acoustic requirements: 5/8 inch thick, 4-foot wide and up to 16-foot long conforming to ASTM C1396 with long edges tapered.
- B. Cement Tile Backer Board: In addition to manufacturers listed in Article 2.01, James Hardie Building Products Inc.
 - 1. Water resistant panels, ½ inch thick on vertical surfaces, 4-foot wide and up to 8-foot 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. 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.

2.03 ACCESSORIES

- A. Metal Trim: Paper-faced metal drywall beads and trim meeting ASTM C1047, as manufactured by USG/Beadex, 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. Provide 30 year warranty against edge cracking.
- B. Joint Compound for gypsum board products: meeting the following requirements:
 - 1. Shall conform to ASTM C475.
 - 2. In areas subject to moisture after installation such as bathrooms and locker areas use setting type joint compound.

3. Interior areas not subject to moisture after installation use drying Type Joint compound.
- C. Joint Tapes for gypsum boards: Shall conform to ASTM C475.
- D. Joint mortar and Tape for Cement board.
 - a. Use type as recommended by cement board manufacturer
 - b. Fiberglass tape: Durock brand tile backer tape
 - c. Joint Mortar: Meet ANSI 118.4
- E. Finishing Materials: Texture coat finish material shall be manufactured by U.S. Gypsum, Hamilton, or Highland Stucco and Lime Products, Inc., or equal.
- F. Acoustical Sealant: Non-hardening, non-shrinking, for use in conjunction with gypsum board, as recommended by Board Manufacturer and conforming to ASTM C919. Sealant shall maintain fire and sound rating assembly.
- G. Fasteners:
 1. Self-drilling, self-tapping bugle-head drywall screws; in conformance to ASTM C1002. No. 6 Type S or S12, 1 5/8-inch long for metal framing,
 2. 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, fire rated design, and sound rating.
 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 inches 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 inches to 7 inches 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.

C. Cement Board Backer System:

1. In shower areas, install water barrier in shingle-like manner to prevent water infiltration into stud cavity. Pre-cut all board to required sizes and make necessary cut-outs.
2. Install cement board in accordance with UL Design and SA-932. Install Cement board plumb and flat. Shim behind board as required.
3. Fasten cement board to steel studs spaced max. 16" o.c. and bottom runners with cement board fasteners spaced 8" o.c. maximum with perimeter fasteners at least 3/8" and less than 5/8" from ends and edges. Studs shall be not less than 20 gage.
4. Tape joints with cement board tape and joint mortar. Finished surface shall be level within 1/8" in 10".

3.02 TOLERANCES

- A. System shall appear flat and monolithic with no exposed joints.

3.03 JOINT TREATMENT AND FINISHING

*At completion of specified taping and finishing, install one coat of drywall primer as specified hereafter

- B. 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 drywall primer over entire surface prior to painting.
- E. Level 5: Install one coat of skim coat over entire surface, followed by one coat of drywall primer over entire surface prior to painting.

3.04 REQUIRED LEVELS OF FINISH

- A. Finishes shall conform to GA 214
- B. 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.

180515

- B. Texture coat shall provide a uniform splatter pattern finish with an 80 percent minimum coverage of the entire surface area.
- 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 3013

CERAMIC TILING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Stone thresholds.

B. Related Requirements:

1. Division 01 - General Requirements.
3. Section 06 1000 - Rough Carpentry
4. Section 07 9200 - Joint Sealants
6. Section 09 2900 - Gypsum Board.

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. Installation Instructions: Manufacturer's preparation and installation instructions.
- D. Product Certificates: Signed by manufacturer certifying that products furnished comply with requirements of this Specification.

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 A185 - 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 North America (TCNA) – 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 the Project Inspector.
- 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 requirements of California Building Code and ADAAG.
- 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.

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 five percent of each type and color as the installed tile, in manufacturers' cartons and labeled.

1.06 WARRANTY

- A. Manufacturer shall provide a five year material warranty.
- B. Installer shall provide a five year fabrication and installation warranty.

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.
 - 3. Florida Tile, Inc.
 - 4. Equal.
- 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.
 - 4. Equal.

2.02 MATERIALS

- A. Colors, Textures, and Patterns: Tile shall be from manufacturer's standard product line. 90 percent shall be from "price group 3", and "10 percent from price group 4", 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 C144.
- D. Portland Cement: ASTM C 50, Type I or II.
- E. Hydrated Lime: ASTM C207, Type S; or ASTM C206 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. 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.
- I. 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.
- J. Backer Rod for sealants (for ceramic mosaic fields): Polyethylene foam, closed-cell, flexible and compressible, 3/16 inch diameter.
- K. 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., Watco Tile and Brick, or equal may be provided.
 - 2. Cleaner: Aqua Mix Concentrated Tile Cleaner, neutral phosphate-free cleaner, or Custom Building Products Tile Lab Concentrated Tile and Stone Cleaner.
 - 3. Sealer: Aqua Mix Penetrating Sealer, fungus- and bacteria-resistant, stain-resistant, and slip-resistant as specified for tile, Custom Building Products Tile Lab Surface Gard, or equal.
- R. Sealants:
 - 1. Sealant and primer shall be from one manufacturer, acceptable to tile and grout manufacturers. See Section 07 9200 - Joint Sealants.
 - 2. Ceramic Mosaic Tile: One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

2.03 TILE

- A. Unglazed Ceramic Mosaic Floor Tile:
1. Size: 1 inch by 1 inch or as indicated.
 2. Colors and patterns to match existing 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 ADAAG.
 - a. As a minimum, the coefficient of friction as measured by ASTM C1028 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 by 4-1/4 inch face dimensions by 5/16 inch thick (ceramic mosaic tile may also be used on walls).
 2. Colors and patterns to match existing from price groups specified.
- C. 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.
- D. 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 inches. 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.
- C. Substrates to receive wall tile and base shall be:
 - 1. Cementitious backing panels, as specified in Section 09 2900 - 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 sealed. Apply sealants to comply with requirements of Section 07 9200 - Joint Sealants.
- G. Conform to manufacturers printed instructions, and applicable requirements of ANSI and TCNA Standards.

3.03 TILE INSTALLATION, FLOOR

- A. 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 sealed. 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.
- B. Minimum coverage of bond mortar shall be 80 percent except 95 percent 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.
- C. Install tile on floors with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 to 1/8 inch.

3.04 TILE INSTALLATION, WALLS

- A. Install tile over 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.
- B. Minimum coverage of bond mortar shall be 80 percent except 95 percent in shower areas or exterior installations. Set and test as specified for floors.
- C. 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.
- D. Install tile on walls with following joint widths:
 - 1. Glazed Wall Tile: 1/16 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.

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 two 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 two 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 SEALANTS

- A. Insure joints to be sealed are free of setting and grouting materials and construction debris. Do not permit any foot traffic on installed sealants for a minimum of 48 hours or protect with hardboard strips.
- B. Install in accordance with Section 07 9200 - 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 5113

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lay-in acoustical ceiling systems and metal suspension system.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 09 2900 - Gypsum Board.

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 five 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.

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 and Practice.
3. Division of the State Architect: Comply with requirements of IR 25-2.10.

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 E580 – Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
 8. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
 9. ASTM E1414 - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
 10. 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, as amended by CBC 1615A.1.16.

1.03

SUBMITTALS

- A. Samples:
1. Lay-in panels of each specified type, 6-inch by 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 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 penetrations with related Work section.

1.06 WARRANTY

- A. Manufacturer shall provide a 10 year material warranty.
- B. Installer shall provide a two year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. USG Corporation.
- B. Armstrong World Industries.
- C. CertainTeed Ceilings Corp.
- D. Equal.

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, C636 and E580 and section 13.5.6 of ASCE 7, as amended by 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: 0.106 inch diameter (0.144 inch diameter 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.

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: 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:
 - 1. Acoustical Ceiling Panels:
 - a. Panel Name: Armstrong Fine Fissured High NRC 1811, USG Radar Climaplus HiNRC 22311, CertainTeed Fine Fissured HHF 497 HNRC, or equal.
 - b. Panel Size: 2-foot by 4-foot.
 - c. Panel Thickness: 3/4 inch.
 - d. Edge Detail: Lay-in.
 - e. Light Reflectance: 0.83 minimum, complying with ASTM E1477.
 - f. CAC: Minimum 35 - 39, UL Classified, complying with ASTM E1414.
 - g. NRC: Minimum 0.70, UL Classified, complying with ASTM C423.
 - h. Color: White.
 - i. Recycled Content: Minimum 37 percent.
 - 2. Suspension System:
 - a. Suspension System Name: Prelude XL by Armstrong, Donn DX by USG, 1200 Seismic Series by Chicago Metallic Corporation, 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 and ASTM E580.
- 2. System shall be complete; with joints neatly and tightly joined and securely fastened; suspension members shall be installed in a true, flat, level plane.
- 3. Hanger Wires: 0.106 inch diameter 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 at least 6 inches from non-braced ducts, pipes, conduits, 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 or within one-fourth (1/4) of the length of the end tee, whichever is least, for the perimeter of the ceiling area.
 - e. Where obstructions prevent direct suspension, provide trapezes or equivalent devices; 1 1/2-inch minimum cold rolled channels back to back may be installed for spans to 6 feet maximum.
 - 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: 0.106 inch diameter 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.
 - f. Maintain wires at least 6 inches from non-braced ducts, pipes, conduit, and other items.
5. Provide additional wires, 0.106 inch diameter 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 two adjacent walls per ASTM 580; but shall be at least 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 stabilizer bar or 0.064 inch diameter 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. Wires shall be fastened with three tight turns minimum for hanger wires and four tight turns minimum bracing wires. Turns shall be made in a 1 1/2-inch maximum distance.
- B. Suspension System for 2-foot by 4-foot Lay-in Acoustical Ceilings:
1. Main Runners: Install main runners 48 inches apart; 0.106 inch diameter 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.
- B. Penetrations through the ceilings for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a 2 inch oversized ring, sleeve or adapter through the ceiling tile to allow free movement of one inch in horizontal directions. Alternatively per ASTM E580, a flexible sprinkler hose fitting that can accommodate one inch of ceiling movement shall be permitted to be used in lieu of the oversized ring, sleeve or adapter.

3.04 AIR DISTRIBUTION DEVICES

- A. Refer to and coordinate with Division 23 - HVAC.
- B. Install air distribution grilles and other devices into suspension system. Install 4 taut wires, each 0.106 inch diameter 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 0.106 inch diameter 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 0.106 inch diameter wires capable of supporting four times the fixture load.

3.06 CLEANING

- A. General: After installation of acoustical material has been completed, clean 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 successfully 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.

111001

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 6513

RUBBER BASE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Topset coved rubber base for installation with surface flooring.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 09 6519 – Vinyl Composition Tile.

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 topset 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 five 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.

1.03 QUALITY ASSURANCE

- A. Qualifications of Installer: Minimum five years experience in successfully installing the same or similar flooring materials.

B. Comply with the following as a minimum requirement:

1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM F1861: Standard Specification for Resilient Wall Base.
3. Comply with current CHPS requirements, www.chps.net.

- 4. Chemically based products such as sealers, primers, fillers, adhesives, etc. must be approved by Owner's Office of Environmental Health and Safety (OEHS).
- 5. Each selected color and configuration shall be from same dye lot and color.

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 five year material warranty.
- B. Installer shall provide a two year fabrication and installation 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.
- D. Johnsonite.
- E. Equal.

2.02 MATERIALS

- A. Rubber base: Conform to ASTM F 861; Group 2, solid (homogeneous); Type 1, TS, (thermoset) vulcanized rubber, Style B (coved), 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 topset base at:
 - 1. Hard floors, including resilient flooring, concrete and wood, carpet tile and other soft floors.
 - 2. Along cabinetry base and where flooring extends into open cabinets.
- 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. 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 6519

VINYL COMPOSITION TILE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition tile flooring as indicated.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 09 6513 - Rubber Base.

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 list and Product Data of recommended finish materials.
- 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 five projects, extending over period of not less than five years, indicating installer's experience record. Submit letter from manufacturer indicating manufacturer's approval for installer of the products.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installer: Minimum five 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 Project Inspector to review installation and procedures required for project.
- D. Comply with the following as a minimum requirement:
 - 1. Materials shall be compliant with requirements of CBC Chapter 11B and ADAAG.
 - 2. ASTM E84: Class A Flame Spread Rating of 25 or less.
 - 3. Moisture Testing: ASTM F1869.

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 five year material warranty.
- B. Installer shall provide a two year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Armstrong Contract Interiors.
- B. Mannington Commercial.
- C. Congoleum, standard grade as manufactured by Mohawk.

D. Or equal.

2.02 MATERIALS

A. Vinyl Composition Tile: Conform to ASTM F1066, Composition 1, asbestos free, Class 2 (through pattern), 12-inch by 12-inch by minimum 1/8 inch thick, colors and patterns to match existing flooring .

1. Tile shall be from same batch and run number for each color.

B. Crack Filler and Leveling Compound: 100 percent 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. Equal, 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 vinyl composition tile, and recommended by manufacturer.

E. Reducer Strips: Tapered rubber not less than one inch wide, and thickness to match tile.

G. 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.

4. Equal.

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 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 deleterious substances and foreign matter.
- E. Moisture Testing: Test new and old concrete slabs for adequate dryness.
 - 1. Testing shall conform to ASTM F1869, and the following. Minimum testing requirements are three 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 three pounds per 24 hours per 1,000 square feet, or as recommended by flooring manufacturer. Provide results of moisture test to the OAR.
 - 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.

3.04 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. Install vinyl composition floor tile when ambient temperature is 70 degrees F or higher or manufacturer's range.
- C. 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.
 - 2. Install adhesive only in area that can be covered by flooring material within the adhesive manufacturer'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 dust, debris, and soil with any combination of sweeping, micro-fiber dust-mopping with a properly treated, non-oily mop and vacuuming.

3.05 CLEANING, WAXING, AND COMPLETION

- A. Maintain 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 vinyl composition tile with two coats of sealer, and four 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 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.

3.06 CLEAN UP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.07 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and exterior painting.

B. 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 REGULATORY REQUIREMENTS

- A. 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. 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.

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 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 Project Inspector.

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 three year material warranty.
 B. Installer shall provide a three year application 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. 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 and Wall coverings
 3. Vista Paints
 4. Sherwin Williams
 5. ICI Paints

6. Equal.

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 Project Inspector that such Work is ready for inspection.
1. Tinting Guideline: The first coat, primer/undercoat(s) to be untinted or tinted up to 50 percent 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 percent to 15 percent 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 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. 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. 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. 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.
7. 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.
8. Concrete: 3 coats.
- a. First: Concrete sealer.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
9. 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: 3 coats. Flat 100 percent acrylic.

- a. Prime Coat: Alkali resistant primer/sealer.
 - b. Exterior 100 percent acrylic.
4. Concrete: 3 coats. Flat 100 percent acrylic.
- a. First Coat: Concrete sealer.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
5. 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:
 - 1) First Coat: Interior waterborne primer.
 - 2) Second and Third Coats: Interior semi-gloss or gloss enamel to match adjoining wall or ceiling finish.
 - b. Building Exterior:
 - 1) First Coat: Exterior waterborne primer.
 - 2) 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.

3.05 PROTECTION

131028

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 1400
SIGNAGE

EDIT NOTE:

- 1. EDIT SECTION TO SUIT PROJECT. DELETE SIGNS NOT APPLICABLE TO PROJECT. ADD SIGNS TYPES AS REQUIRED. DELETE EDIT NOTES BY PLACING CURSOR OVER UPPER LEFT CORNER OF BOX AND SELECTING CUT FROM THE MENU.**
- 2. VERIFY THAT THERE ARE NO CONFLICTS BETWEEN SIGNAGE DETAILS AND NOTES SHOWN ON THE DRAWINGS AND THIS SECTION.**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and exterior accessibility, identification, directional and informational signs.
2. Parking signs.
3. School Name and Address Sign.

B. Related Requirements:

1. Division 01: General Requirements.
2. Section 08 1113: Hollow Metal Doors, Windows and Frames.
3. Section 08 1416: Wood Doors.
4. Division 09: Finishes.
5. Section 13 4216: Wheelchair Lifts.
6. Section 14 2423: Hydraulic Elevators.
7. Section 32 1313 - Site Concrete Work.

1.02 REFERENCES

A. ASTM International:

1. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

3. ASTM D4802 - Standard Specification for Poly (Methyl Methacrylate) Acrylic Plastic Sheet.

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.

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 are acceptable and are the basis for intended design and quality.
 1. H. Toji and Company.
 2. Karman Ltd., Architectural Signs.
 3. Vomar Products Inc.
 4. ASI-Modulex, Inc.
 5. Mohawk Sign Systems, Inc.
 6. Accent Signage Systems.
 7. The Gruenke Company.

8. Ada Sign Products.
9. AccuBraille.
10. Equal.

2.02 MATERIALS AND FABRICATION

A. Interior Sign Materials:

1. Substrate Panel: 1/8 inch minimum thick, integrally colored or clear acrylic plastic, or laminated acrylic. Conforming to ASTM D4802; non-glare (matte), UV stable, suitable for interior and exterior use.
 - a. Edges shall be square and eased.
 - b. Colors to match existing signage from manufacturer's custom color range.
2. 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.

B. Exterior Sign Materials:

1. Sign: ASTM B209 aluminum sheet, 0.080 inch thick with rounded corners of 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.
3. Concrete Post Footings: Refer to Section 32 1313, Site Concrete Work.
4. Fasteners: Stainless steel carriage bolts with tamper resistant nuts.

C. Characters and Symbols: Shall be fabricated by one of the processes described below:

1. 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 minimum 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. 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. 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.

2. Raised characters and graphics including braille shall be integral to sign face and shall be formed into sign face by high pressure thermoforming using a negative mold. No applied, glued, welded tactile elements are acceptable. Raised characters and graphics shall have beveled, eased or rounded edges. No sharp, square edges are acceptable. 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 vinyl film. Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, or other signs are not required to be raised.

2.03 COMMUNICATION ELEMENTS AND FEATURES

A. Raised Characters Raised characters shall comply with CBC 11B-703.2.

1. Character Type: Characters on signs shall be raised 1/32 inch minimum above their background and shall be sans serif uppercase characters duplicated in Braille. Characters and Braille shall be in a horizontal format.
2. Character Height: Character height measured vertically from the baseline of the character shall be 5/8 inch minimum and 2 inch maximum based on the height of the uppercase letter "I".
3. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the letter "I".
4. Stroke Thickness: Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.
5. Character and Line Spacing shall be in conformance to CBC 11B-703.2.7 and 11B-703.2.8.
6. Character Placement: Shall be placed in accordance to Paragraph 2.03, C below.

B. Visual Characters: Visual characters shall comply with CBC Section 11B-703.5. Characters shall be conventional in form, and shall be uppercase or lowercase or a combination of both, as indicated on the drawings. Characters shall not be italic, oblique, highly decorative, or of other unusual forms.

1. Finish and Contrast: Characters and their backgrounds shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or a dark characters on a light background.
2. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase of the letter "I".
3. Character Height: Minimum character height shall comply with CBC Table 11B-703.5.5.
4. Height from Finish Floor or Ground: Visual characters shall be a 40 inches minimum above the finish floor or ground

5. Stroke Thickness: Uppercase letter “P” shall be 10 percent minimum and 20 percent maximum of the height of the character.
 6. Character and Line Spacing: Shall be in accordance to CBC 11B-703.5.8 and 11B-703.5.9.
- C. Braille: Contracted Grade 2 Braille, conforming to CBC 11B-703.3. Braille characters shall be inlaid optically correct acrylic Raster beads into computer drilled holes in the panel surface.
1. Dimensions and Capitalization: Braille dots shall have a domed or rounded shape and shall comply with CBC Table 11B-703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.
 2. Position: Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be placed below the entire line of text. Braille shall be separated 3/8 inch minimum and 1/2 maximum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.
- D. Pictograms: In conformance to CBC 11B-703.6. Pictograms shall have a field height of 6 inches minimum. Characters and Braille shall not be located in the pictogram field.
1. Finish and Contrast: Pictograms and their field shall have a non-glare finish. Pictograms shall contrast with their field with either a light pictogram on a dark field or a dark pictogram on a light field.
 2. Text Descriptors: Pictograms shall have text descriptors located directly below the pictogram field, and shall comply with CBC 11B-703.2, 11B-703.3 and 11B-703.4.
- E. International Symbol of Accessibility (ISA): Shall comply with CBC 11B-703.7 and CBC Figure 11B-703.7.2.1. The ISA shall consist of a white figure on a blue background. The blue color shall be approximate to FS. 15090 in Federal Standard 595C.
- F. Mounting Locations and Height: Signs with tactile characters shall be as indicated on the drawings and in conformance to CBC 11B-703.4.
1. Mounting Locations:
 - a. Identification signs for rooms and spaces shall be located on the wall adjacent to the latch side of the door, as one enters the room or space.
 - b. Signs that identify exits shall be located at the exit door when approached in the direction of egress travel.
 - c. Signs containing tactile characters shall be located so that a clear floor space 18 inches minimum by 18 inches minimum, centered on the tactile

characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.

- d. Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side.
 - e. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located at the inactive leaf.
 - f. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right hand door.
 - g. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall.
2. Mounting height above finish floor or ground: Tactile characters on signs shall be located 48 inches minimum above the finish floor or ground surface, measured from the baseline of the lowest Braille cells and 60 inches maximum above the finish floor or ground surface, measured from the baseline of the highest line of raised characters.

2.04 ROOM IDENTIFICATION SIGNS

A. Room Identification Sign Types:

1. Room Identification Sign with Room Name and Room Number: 7 inches high by 9 inches wide, minimum. Room name shall be raised characters 3/4 inches high minimum, and room number 1 inch minimum; and shall be accompanied with Braille indicators.

B. Room Identification Sign Requirements:

1. Finish and Contrast: Refer to paragraph 2.03.B.
2. Raised Characters and Proportions: Refer to paragraph 2.03.A.
3. Braille: Refer to paragraph 2.03.C.
4. Mounting Location and Height: Refer to paragraph 2.03.F.

2.05 RESTROOM SIGNAGE

A. Geometric Symbols:

1. Doorways leading to toilet rooms shall be identified by a geometric symbol complying with CBC Section 11B-703.7.2.6.
2. “All Gender” Restroom Door Sign (Single occupancy restrooms): 1/4 inch thick circle, 12-inch diameter with a 1/4 inch thick equilateral triangle with the vertex pointing upward superimposed on the circle and within the 12-inch diameter. Triangle and circle shall be of contrasting colors; the circle symbol

shall contrast with the door. A female and male silhouettes shall appear within the equilateral triangle in contrasting color to it, and the word “restroom” shall appear on the bottom part of the circle in contrasting color to it.

3. Edges and Vertices on Geometric Symbols: Shall be eased or rounded at 1/16 inch minimum, or chamfered at 1/8 inch maximum. Vertices shall be radiused between 1/8 inch minimum and 1/4 inch maximum.
4. Location and Mounting Height: Symbols shall be mounted at 58 inches minimum and 60 inches maximum above the finish floor or ground surface measured from the centerline of the symbol. Where a door is provided the symbol shall be mounted within one inch of the vertical centerline of the door.

B.

- C. Room Identification for Single-Occupancy Restrooms: Provide a 16 inch long by 6 inch tall room identification sign, including a pictogram of the International Symbol of Accessibility on a side. Text descriptor shall be “All Gender Restroom”. Characters, Braille, pictograms and mounting locations and height shall be in conformance to Article 2.03.

2.06 RAISED CHARACTER AND BRAILLE EXIT SIGNS

A. Tactile Exit Sign Types:

1. “EXIT”.
2. “EXIT RAMP DOWN”.
- 3.

B. Sign Requirements:

1. Finish and Contrast: Refer to paragraph 2.03.B.
2. Raised Characters and Proportions: Refer to paragraph 2.03.A.
3. Braille: Refer to paragraph 2.03.C.
4. Mounting Location and Height: Refer to paragraph 2.03.F.

2.10 ASSISTIVE LISTENING DEVICE SIGN

A. Include International Symbol of Access for Hearing Loss, CBC Figure 11B-703.7.2.4, with text “Assistive-Listening System Available”. Use upper and lower case characters. Sign shall comply with the following requirements:

1. Finish and Contrast: Refer to paragraph 2.03.B.

2. Character Height and Proportions: Refer to paragraph 2.03.B.
3. Symbol of Accessibility: Refer to paragraph 2.03.E.

2.13 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. Directional Signs: Refer to paragraph 2.03.B.
 2. Symbol of Accessibility: Refer to paragraph 2.03.E.
- E. No Smoking Sign: Provide at each building entrance. Reverse cut white vinyl sign with 4 1/2-inch high no smoking symbol, mounted on glass entry doors. Under No Smoking symbol, place words "No Smoking", ½ inch high minimum, San Serif upper and lower case characters.

2.14 PARKING SIGNS

- A. Tow-Away Sign: 18 inches by 24 inches with rounded corners. Black graphics on white background, with lettering not less than 1 inch high. Sign to read: "UNAUTHORIZED VEHICLES PARKED IN DESIGNATED ACCESSIBLE SPACES NOT DISPLAYING DISTINGUISHING PLACARDS OR SPECIAL LICENSE PLATES ISSUED FOR PERSONS WITH DISABILITIES WILL BE TOWED AWAY AT THE OWNER'S EXPENSE. TOWED VEHICLES MAY BE RECLAIMED AT BOB CARLSON TOWING 1300 FLEET AVE. (805) 483-2276".
- B. Parking Space Identification Sign: 12-inch by 18-inch with rounded corners. White reflectorized graphic on dark blue background, and shall display an 8-inch high International Symbol of Accessibility per paragraph 2.03.E.
 1. Additional language or an additional sign below the International Symbol of Accessibility shall state I "Minimum Fine \$250".
 2. Signs identifying van accessible parking spaces shall contain additional language or an additional sign with the designation "Van Accessible".
- C. Signs shall be mounted on posts at head of each accessible parking with lower edge 80 inches minimum above ground surface, or mounted on walls at a minimum height of 60 inches from ground surface.

- D. Headroom Signs: On parking structures provide signs indicating headroom clearance height at entries and at any point of a vehicular path where entry clearance height is reduced. Minimum character height shall be 3 inches.

2.15 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". Indicate occupant load shown on drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts condition of existing surfaces.

3.02 METHODS OF INSTALLATION

- A. Interior Identification Signs and Interior Directional Signs:
 1. Fasten to wall with four 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 three tamper-proof oval-head counter-sunk screws.
- C. Exterior Post Mounted Directional Signs: Size of required footing shall be as indicated on the drawings. Fasten sign with tamperproof stainless steel bolts.
- 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. Cement Plaster, 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 gage hog rings, King Hughes Fasteners 5150DG50, or equal, with 11/16 inch opening at each corner 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 indicated above. Fasten sign to backplate with high-bond double-faced tape and silicone.

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 2813
TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Toilet accessories.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 06 1000- Rough Carpentry.
3. Section 05 4100 - Structural Metal Stud Framing.
4. Section 10 2113 - Plastic Toilet Compartments.
5. Section 10 2815 – Hand and Hair Dryers.

1.02 REGULATORY REQUIREMENTS

A. Comply with CBC Chapter 11B requirements and ADAAG 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 10 2113 - Plastic 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.

2.02 TOILET ACCESSORIES

- A. Liquid Soap Dispenser: 20 gage stainless steel, 40-ounce. capacity, tamper-proof cap and concealed vandal-proof mounting. Continental V 444SS, ASI 0347, Bobrick B-2111, or equal. Fasten with minimum 3 - #8 x 2" long stainless steel sheet metal screws.
- B. Toilet Paper Boxes:
1. For Faculty and Staff Restrooms:
 - a. Accessible toilet rooms or compartments:
 - 1) Semi-recessed Bobrick B4388 or 3888, ASI 0031, Bradley 5412 (double roll tissue holder without paper roll spindle stops), or equal. Fasten with minimum 4 - #8 x 2" long stainless steel sheet metal screws.
 - 2) Surface mounted ASI 0264-1A2, Bobrick B-27460 (double roll tissue holder), Bradley, or equal. Fasten with minimum 4 - #8 x 2" long stainless steel sheet metal screws.
- C. Paper Towel Boxes: Type 304 stainless steel, satin finish. Door with tumbler lock and piano hinge. Fasten with minimum 4 - #8 x 2" long stainless steel sheet metal screws.
1. Semi-recessed: ASI 0457-2, Bradley 247-10, or equal.
- D. Toilet Seat Cover Dispensers (Faculty and Staff Toilet Rooms only): Surface-mounted, Type 304 stainless steel, satin finish. ASI 0477SM, Bobrick B-221, Bradley, or equal. Fasten with minimum 4 - #8 x 2" long stainless steel sheet metal screws.
- E. Sanitary Napkin Disposals
1. Disposals in accessible toilet rooms or compartments: recessed, semi-recessed or 3-inch maximum projection from wall surface; Bobrick B 353 (recessed), ASI 0473 (recessed), Bradley, or equal. Fasten with minimum 2 - #8 x 2" long stainless steel sheet metal screws.
- F. Coat Hook Strip: Hook strip shall be type-304 stainless steel with satin finish. Hooks shall be 14 gauge and mounting strip shall be 20 gauge. ASI 1307, Bobrick B-232 x 24, Bradley 9943, or equal. Fasten with minimum 6 - #8 x 2" long stainless steel sheet metal screws.

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 in accordance with manufacturer's written recommendations and accessibility requirements. Fasten components firmly in place.
- B. Drill holes to correct size and application that is concealed by item with ¼ inch tolerance.
- C. Install recessed accessories into wall openings with sheet metal screws into metal frames.
- D. Install surface-mounted accessories to backing plates with machine screws, plumb, and aligned.
- E. Mirrors: Install mirror on manufacturer supplied concealed wall hanger and fasten with two theft-resistant locking screws.
- F. Before Substantial Completion, deliver keys and maintenance instructions and product data to OWNER.

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 22 0500

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Basic Mechanical Requirements specifically applicable to Division 22 Sections, in addition to the General Requirements.
- B. Plumbing work includes the following: furnish and install all piping and plumbing fixtures shown on the plumbing drawings and described in these specifications. In connection with this work, contractor shall also furnish and install all necessary work, devices, hardware, systems and services required to make said systems properly and safely operable, including, but not limited to, mounting hardware, framing, insulation, valves, flashing, cleanouts, cutting, concrete coring and cutting, patching and equipment installation.

1.2 WORK SEQUENCE

- A. Install work in phases to accommodate Owner's construction requirements. Refer to Plumbing Drawings for the construction details and coordinate the work of this division with that of other divisions. Order the work of this division so that progress will harmonize with that of other divisions and all work will proceed expeditiously. During the construction period, coordinate plumbing schedule and operations with General Contractor and any other related subcontractor.

1.3 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work as required.

1.4 SUBMITTALS

- A. Submit the following:
- B. Proposed Products List: Include Products specified in the following Sections:
 - 1. Division 22 - Plumbing.
 - 2. Project Drawings
- C. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. Submittals shall be specific to the fixtures/device/unit being submitted; the data shall be

highlighted or marked so as to be quite clear as to the fixtures/devices/units that shall be provided.

- D. Equipment and materials shall be ordered only after satisfactory review by Owner and Engineer.
- E. The following statement applies to all items reviewed. "Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for dimensions which shall be confirmed at the job site; fabrication processes and techniques of construction; coordination of his work with that of other trades; and the satisfactory performance of his work."
- F. Contractor shall clearly mark the submittal sheet as to which model number, size, color, etc. when there is more than one choice available.
- G. Maintain a complete set of the most current reviewed submittal and shop drawings on site during construction.
- H. Submittals shall have table of contents organized by specification section and shall clearly identify electrical characteristics, options provided, color, model number and equipment tag as indicated on the drawings. .

1.5 REGULATORY REQUIREMENTS

- A. Conform to 2019 California Building Code.
- B. Plumbing: Conform to 2019 California Plumbing Code.
- C. Electrical: Conform to 2019 California Electrical Code.
- D. Conflicts: Where conflict or variation exists amongst Codes, the most stringent shall govern.

1.6 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings, unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other Sections. Obtain permission of owner before proceeding.
- C. PIPING LOCATIONS: Piping locations shown are diagrammatic only. Contractor shall verify locations of all lateral stubs, offsets, etc. required in the field. The actual locations of lines, cleanouts and connections may vary provided that complete systems are installed in compliance with codes. It is not the intent

of the drawings to show necessary offsets required to avoid structure or other trades. It is the intent of this paragraph that all costs associated with this paragraph be borne by the contractor.

- D. **CONSTRUCTION OBSERVATION:** In addition to the requirement for obtaining inspections by the local jurisdiction, contractor shall notify Engineer at appropriate times during the construction process so that Engineer can visit site to become generally familiar with the progress and quality of contractor's work and to determine if the work is proceeding in general accordance with the contract documents.
- E. **SCALING OF DRAWINGS** -In no case shall working dimensions be scaled from plans, sections, or details from the working drawings. If no dimension is shown on the architectural drawings, the prime contractor shall request in writing that the architect or engineer provide clarification or the specific dimension.
- F. **AS EQUAL** - For an item to be substituted "as equal" the contractor must provide to the engineer a complete submittal no later than 7 days prior to the bid opening. Contractor shall be responsible for any cost associated with the change including architectural design, mechanical, structural, and electrical engineering, and changes in any element of the building.
- G. **REMODELING CONTRACT / EXISTING CONDITIONS:** The contractor shall, at its sole cost and expense, inspect the site of the proposed work to become fully acquainted with conditions relating to the work and to fully understand the facilities, difficulties, and restrictions attending the execution of the work under the contract documents and cost thereof.

1.7 QUALITY ASSURANCE

- A. **Qualification of Manufacturer:** Products used in work shall be produced by manufacturers regularly engaged in the manufacture of similar items.
- B. **Qualification of Installer:** Use adequate number of skilled workman, thoroughly trained and experienced in the necessary crafts, and completely familiar with the specified requirements contained in the plans and specifications.
- C. **Maintain uniformity of manufacturer for equipment used in similar applications and sizes.**
- D. **Provide products and materials that are new, clean, free from defects, damage, and corrosion.**
- E. **Provide name/data plates on major components with manufacturer's name, model number, serial number, date of manufacturer, capacity data, and electrical characteristics permanently attached in a conspicuous location on the equipment.**
- F. **Applicable equipment and materials to be listed by Underwriters' Laboratories**

and manufactured in accordance with ASME, AWWA, or ANSI standards. Power using equipment shall be meet the California energy efficiency standards as defined in the current Title 24 requirements.

- G. District Standards for materials and equipment are available from the VUSD Facilities Department. Materials listed as district standards have been chosen in order to match other products already in use within the district as required for maintaining serviceability and spare parts in compliance with the California Public Contract Code

1.8 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are intended to complement each other. Where a conflict exists between the requirements of the drawings and/or specifications, immediately and before commencing work, request clarification from Engineer.
- B. The Engineer shall interpret the drawings and the specifications, and the Engineer's decision as to the true intent and meaning thereof and the quality, quantity, and sufficiency of the materials and workmanship furnished thereunder shall be accepted as final and conclusive.
- C. In case of conflicts not clarified prior to Bidding deadline, use the most costly alternative (better quality, greater quantity, or larger size) in preparing the Bid. A clarification will be issued to the successful Bidder as soon as feasible after the Award and if appropriate a deductive change order will be issued.
- D. All provisions shall be deemed mandatory except as expressly indicated as optional by the word "may" or "option".
- E. Examine and compare the contract drawings and specifications with the drawings and specifications of other trades. Report any discrepancies to the architect. Install and coordinate the work in cooperation with the other trades.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all equipment per the manufacturer's instructions for installing, connecting, and adjusting. A copy of the instructions shall be kept at the equipment during installation and provided to the engineer at his/her request.
- B. Adjust pipes, to accommodate the work to prevent interferences.
 - 1. Right-of-Way: Lines which pitch have the right-of-way over those which do not pitch. Lines whose elevations cannot change have right-of-way over lines whose elevations can be changed.

2. Provide offsets, transitions, and changes in directions of pipes as required to maintain proper head room and pitch on sloping lines. Provide traps, air vents, drains, etc., as required.

3.2 COORDINATION OF WORK

- A. The contract documents establish scope, materials, and quality but are not detailed installation instructions. Drawings are diagrammatic.
- B. The contract documents show the general arrangement of equipment, ductwork, piping, and accessories. Provide offsets, fittings, and accessories which may be required but are not shown on the drawings. Investigate the site and review the other trades installation locations and requirements to determine conditions affecting the work and provide such work and accessories as may be required to accommodate such conditions.
- C. Whenever work interconnects with the work of other trades, coordinate to insure that all parties concerned have the necessary information required for a proper installation.

3.3 RECORD DRAWINGS

- A. Maintain on a daily basis at the project site a complete set of record drawings reflecting an accurate dimensional record of all deviations between work shown on the drawing and that actually installed.
- B. Provide two reproducible copies of the record drawing to the owner.

3.4 FINAL REVIEW

- A. Provide to the owner a certification that all fixtures and equipment are properly functioning and adjusted.

END OF SECTION

SECTION 22 0505

TRENCHING AND BACKFILLING FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Excavating and backfilling for utility trenches.
 - 2. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
- B. Related Sections include the following:
 - 1. Divisions 22 and 23 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- F. Fill: Soil materials used to raise existing grades.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

- H. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- I. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Each type of plastic warning tape.
 - 2. Backfill sand and soil.
- J. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 698 or ASTM D 1557 for each on-site and borrow soil material proposed for backfill.

1.5 QUALITY ASSURANCE

- K. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

1.6 PROJECT CONDITIONS

- L. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.
 - 4. Contractor shall make a plan and provide temporary utility services as required to maintain services to buildings operating during construction.

- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: As approved by the project Geotechnical consultant.
- C. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- D. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- E. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
- B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Prepare subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface.
- C. Protect and maintain erosion and sedimentation controls.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding. Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system, to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXCAVATION FOR UTILITY TRENCHES

- C. Underground alert: Before laying out piping and performing trenching, contractor shall determine locations of existing underground utilities. Contact "Dig Alert / Underground Service Alert of Southern California" - 1-800-422-4133. Contractor shall also contact owner's representative to ascertain locations of underground piping and other conditions affecting trenching and shall perform testing and subsurface exploration as necessary to locate utilities.
- B. Trenching: Material shall be excavated from trenches and piled adjacent to the trench. Material shall be piled in such a manner that will cause a minimum of inconvenience to public travel. All rock, boulders, and stones shall be removed to provide a minimum clearance of six (6) inches under and around pipes. Excavations shall be kept free of water. Trenches shall be dug to true and smooth bottom grades and in accordance with the lines indicated on drawings and as directed. Trench widths shall not exceed 30 inches or 1.5 times outside diameter of the pipe plus 18 inches, whichever is greater. Minimum trench width shall be the outside diameter of pipe installed plus 12 inches. Depth of trenching for water and gas piping shall be such as to give a minimum cover of 18 inches over the top of the pipe. Deeper excavation may be required due to localized breaks in grade, or to install the new piping under existing culverts or other utilities where

necessary. Trenching for sewers and drains shall be of sufficient width to permit proper jointing of the pipe and back filling of material along the sides of the pipe. Trench width at the surface of the ground shall be kept to the minimum amount necessary to install the pipe in a safe manner. Trenches shall be excavated below the barrel of the pipe a sufficient distance to provide for bedding material where the trench bottom is in a material which is unsuitable for foundation or which will make it difficult to obtain uniform bearing for the pipe. Such material shall be removed and a stable foundation provided. This shall include the preparation of the native trench bottom and/or the top of the foundation material to a uniform grade so that the entire length of pipe rests firmly on a suitable properly compacted material (sand or gravel required). Gravel to be used for foundation purposes shall be of a type and gradation to provide a solid compact bedding in the trench.

1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade with bedding course.
2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.4 UTILITY TRENCH BACKFILL

A. Backfill: Contactor shall complete bedding and then backfill to 6 inches over the top of the pipe with sand before starting backfilling operations. Take all precautions necessary to protect the pipe from damage, movement and shifting. Compaction equipment used above the pipe zone shall be of a type that does not injure the pipe. Where original excavated material is unsuitable for trench backfill, backfill gravel shall be placed. Unsuitable material shall be removed to the disposal area. Whenever a trench is excavated in a paved roadway, sidewalk or other area where minor settlements would be detrimental and where native excavated material is not suitable for compaction as backfill, trench shall be backfilled with backfill gravel. Warning tape markers and tracer wires shall be installed during backfill operations. When working in an existing traveled roadway, restoration and compaction shall be achieved as the trench is backfilled so as to maintain traffic. Provide temporary, traffic-bearing steel plates over excavations in public rights-of-way, if backfilling and re-paving cannot be accomplished before end of work period. Trench backfill under roadway shall be

mechanically compacted to 95 percent of maximum density except for trenches over 8 feet in depth. In any trench in which 95 percent density cannot be achieved with existing backfill, the top 4 feet shall be replaced with backfill gravel mechanically compacted to 95 percent. The method of compaction shall be at contractor's option, unless excavation permit requires a specific type. Contractor shall be responsible to provide the proper size and type of compaction equipment and select the proper method of utilizing said equipment to attain the required compaction density. Compaction by water jetting will not be permitted. Where backfill is required to be certified, compliance shall be performed in accordance with the requirements of the governing authority. Allow testing service to inspect and approve each subgrade and fill layer before further fill, backfill or construction work is performed.

- B. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- C. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- D. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION

SECTION 22 0510

PLUMBING PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, notes, and general provisions of the Contract, including General and Supplemental Conditions, apply to this section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings for domestic water, and waste & vent.
 - 2. Escutcheons.
 - 3. Cleanouts.

1.3 REFERENCES

- A. ANSI B31.9 - Building Service Piping.
- B. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.
- C. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- D. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.
- E. ASTM B32 - Solder Metal.
- F. ASTM B88 - Seamless Copper Water Tube.
- G. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- H. ASTM D1785 - Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- I. ASTM D2235 - Solvent Cements for Acrylonitrile Butadiene Styrene (ABS) Pipe & Fittings.
- J. ASTM D2241 - Poly Vinyl Chloride (PVC) Plastic Pipe (SDR-PR).
- K. ASTM D2466 - Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.

- L. ASTM D2564 - Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings.
- M. ASTM D2661 - Acrylonitrile Butadiene Styrene (ABS) Drain, Waste and Vent Fittings.
- N. ASTM D2855 - Making Solvent-Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings.
- O. ASTM D3034 - Poly Vinyl Chloride (PVC) Plastic Sewer Pipe SDR-35.
- P. ASTM D3965 - Acrylonitrile Butadiene Styrene (ABS) Plastic Pipe.
- Q. ASTM 306 – Drain, Waste, & Vent (DWV) Copper tube & fittings.
- R. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- S. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.
- T. NSF – Third Party Testing for No-hub Couplings.

1.4 SUBMITTALS

- A. Product Data: For the following products:
 - 1. Piping and fittings.
 - 2. Escutcheons.
 - 3. Cleanouts.
- B. Project Record Documents
 - 1. Submit the following:
 - 2. Record actual locations of valves and piping.
- C. Operation and Maintenance Data
 - 1. Submit the following:
 - 2. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.5 REGULATORY REQUIREMENTS

- A. Construction shall comply with the California Code of Regulations, Title 24, including the 2019 California Building code and the 2019 California Plumbing Code

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of the general requirements.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

1.8 RECORD DOCUMENTS

- A. Accurately record results of exploratory investigations regarding locations and characteristics of existing buried pipelines and conduits, for Record Documents
- B. Accurately record locations of constructed pipelines, fittings, valves, connections and appurtenant structures, including depth below finish grade to waterlines and invert elevations of sewer, for Record Documents.
- C. Accurately record changes from construction identified on Drawings and Specifications, including unexpected physical conditions and unmarked or inaccurately marked existing utilities, for Record Documents

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. SEWER PIPE: ABS DWV SCH.40 PIPE & FITTINGS –ASTM-D3965.
 - 1. All ABS waste piping shall be manufactured in the United States

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hubless, service weight, U.S. manufactured.
 - 1. Fittings: Cast iron, U.S. manufactured.

2. Joints: ASTM C564, neoprene gasket system with 4-band NSF – Certified stainless steel band clamps.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight, U.S. manufactured.
 1. Fittings: Cast iron, U.S. manufactured.
 2. Joints: Neoprene gaskets with 4-band NSF – Certified stainless steel band clamps-and-shield assemblies.

2.4 WATER PIPING, BURIED, WITHIN 5 FEET OF BUILDING

- A. Copper Tubing: ASTM B88, Type K, soft, U.S. manufactured.
 1. Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze.
 2. Joints: ASTM B32, lead-free solder, Silver bearing. Bridget or Equal. Braze underground parts.
 3. Transitions from underground PVC to above ground copper tubing shall be made with male PVC fitting to female copper fittings. Provide brass unions.

2.5 WATER PIPING, BURIED, BEYOND 5 FEET OF BUILDING

- A. PVC Pipe: ASTM D1785, Schedule 80.
 1. Fittings: ASTM D2466, PVC. Male PVC threaded fitting at connection to copper tubing.
 2. Joints: ASTM D2855, solvent weld with ASTM D2564 Solvent cement.

2.6 WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn, U.S. manufactured.
 1. Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze.
 2. Joints: ASTM B32, lead-free solder, Silver bearing. Bridget or Equal

2.7 ESCUTCHEONS

- A. Escutcheons for gas, condensate, water and waste, and vent piping penetrations.
 1. Manufacturers: subject to compliance with requirements, provide products

- by the following:
 - a. Brasscraft.
 - b. or equal
- 2. Description: chrome-plated cast brass with set screws.

2.8 CLEANOUTS

- A. Cleanouts for waste piping.
 - 1. Manufacturers: subject to compliance with requirements, provide products by one of the following:
 - a. J.R. Smith
 - b. Zurn.
 - 2. Description: cast-iron with threaded bronze plug. 18 gage stainless cover with vandal-proof screws for wall cleanout. Polished brass non-slip cover for floor cleanout. Concrete box for cleanout to grade.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Install in accordance with Manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.

- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance for installation of insulation and access to valves and fittings. Valves shall be easily accessible.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Establish elevations of buried piping outside the building to ensure not less than 30 inch of cover. Exception: Localized areas may be 18" deep to accommodate existing conditions.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.
- L. Excavate in accordance with this Section for work of this Section.
- M. Backfill in accordance with this Section for work of this Section.
- N. Install bell and spigot pipe with bell end upstream.
- O. Install valves with stems upright or horizontal, not inverted.
- P. Underground Alert: Before laying out piping and performing trenching, contractor shall determine locations of existing underground utilities. Contact "Dig Alert / Underground Service Alert of Southern California" - 1-800-422-4133. Contractor shall also contact District's representative to ascertain locations of underground piping and other conditions affecting trenching, and shall perform testing and subsurface exploration as necessary to locate utilities. Do not perform trenching until all utilities have been located and marked.
- Q. Trenching: See spec. 220505 Trenching & Backfilling for Piping
- R. See section W below for special backfill requirements for buried cast iron piping.
- S. Seal all penetrations through exterior walls and fire rated walls with 3M Firestopping materials for fire rating capacity per the architectural plans and CBC requirements.
- T. Test all piping per 2019 California Plumbing Code Requirements.
- U. Disinfect piping.

- V. Buried Cast Iron Piping. All buried cast iron pipe shall be double wrapped with 8-mil polyethylene (Polywrap), and provide backfill 6" minimum all around pipe using clean sand backfill, with testing performed by a corrosion engineering laboratory. The sand shall meet the following requirements:
 - 1. Minimum saturated resistivity of no less than 3,000 OHM-CM.
 - 2. pH between 6.0 and 8.0.
 - 3. Chloride content of less than 150 PPM.
 - 4. Sulfate content of less than 1,000 PPM.
 - 5. Ammonium concentration less than 10 PPM.
 - 6. Nitrate concentration less than 50 PPM.

- W. Underground copper piping shall be sleeved with polyethylene plastic.

3.4 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.5 ERECTION TOLERANCES

- A. Establish invert elevations, slopes for drainage to 1/4 inch per foot minimum. Maintain gradients.
- B. Slope water piping and arrange to drain at low points.

END OF SECTION

SECTION 22 0523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Bronze ball valves.
- 2. Hydrants.

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.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.5 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.
 2. ASME B31.1 for power piping valves.
 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 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 angle, gate, and globe valves closed to prevent rattling.
 4. Set ball and plug valves open to minimize exposure of functional surfaces.
 5. Block check 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

2.1 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. 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. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

F. Lead Content: Comply with State of California laws SB1334.

2.2 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. Conbraco Industries, Inc.; Apollo Valves.
 - b. NIBCO INC. S-685-80-LF less than 2"; NIBCO INC. T-113-LF 2" or larger.
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: Sweat.
 - g. Seats: PTFE or TFE.
 - h. Stem: Bronze.
 - i. Ball: Chrome-plated brass.
 - j. Port: Full.

2.3 VALVE BOXES

A. MANUFACTURERS

1. Christy – Concrete Box
2. or equal

B. Install with lid identifying type of service.

2.4 HYDRANTS

A. Hydrants

1. Manufacturer: subject to compliance with requirements, provide products by the following:
 - a. J.R. Smith.

- b. Zurn.
 - c. Nibco.
 - d. Watts.
2. Lead-free compliant.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 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.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 1. Domestic Water Shutoff Service: Ball valves.
 2. Throttling Service: Globe 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, except wafer types, with the following end connections:
1. For Copper Tubing, 2" and Smaller: Soldered ends.
 2. For Copper Tubing, 2-1/2" to NPS 4". Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 3. For Steel Piping, 2-1/2" and Smaller: Threaded ends.
 4. For Steel Piping, 2-1/2" TO 4". Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 5. For Steel Piping, NPS 5 and Larger: Flanged ends.
 6. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved.

END OF SECTION

SECTION 22 4000

PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section. Also included are kitchen and architectural drawings.

1.2 SUMMARY

- A. This Section includes the following plumbing fixtures, equipment, and related components:
 - 1. Water Closets & Flush Valve.
 - 2. Lavatories & Faucet
 - 3. Hydrant.

1.3 DEFINITIONS

- B. ABS: Acrylonitrile-butadiene-styrene plastic.
- C. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- D. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- E. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- F. 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.
- G. FRP: Fiberglass-reinforced plastic.
- H. PMMA: Polymethyl methacrylate (acrylic) plastic.
- I. PVC: Polyvinyl chloride plastic.
- J. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.4 SUBMITTALS

- K. 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.
- L. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- M. Warranty: Special warranty specified in this Section.

1.6 WARRANTY

- N. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures of unit shell.
 - b. Faulty operation of controls, blowers, pumps, heaters, and timers.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Period for Commercial Applications: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WATER CLOSETS & FLUSH VALVE

A. Water Closets:

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Standard Madera
 - 1) White Vitreous China, Elongated Bowl, Floor Mount.

B. Flush Valve

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Sloan Model 111-128
 - 1) 1.28 Gal. Max Flush
 - 2) Commerical elongated open front seat

2.2 LAVATORIES & FAUCET

A. Lavatories

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Kohler Hudson Model K2810
 - 1) White Vitreous China, Elongated Bowl, Wall Mount.
 - 2) With support arms, tailpiece, trap arm, ADA compliant cover.

B. Faucet

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Chicago Faucet Model 3400-ABCP MVP

2.3 HYDRANTS

A. Hydrants:

1. Manufacturers: subject to compliance with requirements, provide products by the following:
 - a. Watts
 - b. Or Equal
 - c.

2.4 DRINKING FOUNTAIN

A. Drinking Fountain

1. Elkay Model LK4430
2. Verify color via RFI to Architect.
3. Tri-level ADA compliant
4. Rated for outdoors and heavy duty vandal resistant
5. Stainless steel anchors.

PART 3 - EXECUTION

3.1 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. Verify existing pipe sizes are adequate for new fixture faucets and flush valves.
- C. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- E. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- F. Install direct and indirect drains per Ventura County Environmental Health Requirements.
- G. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- H. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- I. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- J. Install wall-mounting fixtures with tubular waste piping attached to supports.
- K. Install fixtures level and plumb according to roughing-in drawings.
- L. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or 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."
- M. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- N. 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.
- O. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- P. 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.

- Q. 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."
- R. 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."

3.3 CONNECTIONS

- S. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- T. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.4 FIELD QUALITY CONTROL

- U. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- V. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- W. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- X. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.5 ADJUSTING

- Y. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- Z. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

- AA. 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.

BB. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

CC. Provide protective covering for installed fixtures and fittings.

DD. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

3.8 FIXTURE HEIGHTS AND LOCATIONS

EE. Install fixtures to locations and heights above finished floor as indicated on architectural drawings.

EE. Accessible plumbing fixtures shall comply with all of the requirements of CBC Section 1115B.

END OF SECTION

SECTION 26 0000

GENERAL PROVISIONS

PART 1 - GENERAL

- A. The general contract provisions apply to this section and take precedent over this section in case of conflict.

1.01 GENERAL PROVISIONS

- A. This division supplements the applicable requirements of other divisions.

1.02 DEFINITIONS

- A. For the purposes of Division 260000, the following definitions apply:
 - 1. Provide: Furnish and install.
 - 2. Indicated: As shown on the drawings or specified herein.
 - 3. Circuit Designation: Panel designation and circuit number, i.e., LA-13.
 - 4. Approved equal: Approved by the engineer of record as equal in his sole determination.

1.03 SCOPE OF WORK

- A. The Specifications for Work of Division 260000 include, but are not limited to the following sections:
 - 26 0000–General Provisions
 - 26 0030–Tests and Identification
 - 26 0050–Basic Electrical Materials and Methods
 - 26 0111–Conduits
 - 26 0120–Conductors
 - 26 0130–Electrical Boxes
 - 26 0133–Terminal Cabinets
 - 26 0140–Wiring Devices
 - 26 0142–Nameplates and Warning Signs
 - 26 0163–Distribution Panelboards
 - 26 0164–Branch Circuit Panelboards

26 0170–Disconnects
26 0190–Support Devices
26 2450–Grounding
26 2510–Lighting Fixtures
26 4721–Fire Alarm and Detection System

B. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this division, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all divisions for related work required to be included as work under this division.
2. General provisions for electrical work.
3. Site observation including existing conditions.

C. Related Work Specified Elsewhere but included in the scope of work:

1. Motors and their installation.
2. Control wiring and conduit for heating, ventilating and air conditioning.

D. Work Not In Contract (N.I.C.):

1. Telephone instruments.

E. Coordination

1. The following supplements are additional General Requirements pertaining to work of this Division. Provisions of Division 1 - General Requirements shall remain in effect.
 - a. Coordinate work of various sections of Division 26 and 27.
 - b. Coordinate work of this Division 26 with work of Divisions 2 through 25.

2

1.04 REFERENCE STANDARDS

- A. American National Standards Institute (ANSI).
- B. Association of Edison Illuminating Companies (AEIC).
- C. Electrical Testing Laboratories (ETL).
- D. Illuminating Engineering Society (IES).
- E. Institute of Electrical and Electronic Engineers (IEEE).
- F. Insulated Cable Engineers Association (ICEA).
- G. National Electrical Manufacturers Association (NEMA).
- H. National Fire Protection Association (NFPA).
- I. Underwriters Laboratories, Inc. (UL).
- J. California State Fire Marshal (CSFM).
- K. California Energy Commission (CEC) Title 24.

1.05 QUALITY ASSURANCE

- A. Regulations: All the electrical equipment and materials, including their installations, shall conform to the following applicable latest codes and standards:
 - 1. California Electric Code, Latest Adopted Edition (NEC)
 - 2. Local and State Fire Marshal.
 - 3. Occupational Safety and Health Act (OSHA).
 - 4. Requirements of the Serving Utility Company.
 - 5. Local Codes and Ordinances.
 - 6. Requirements of the Office of the California State Architect (OSA).

7. California Administrative Code, Title 8, Chapter 4, Industrial Safety Orders.
 8. California Administrative Code, Title 24.
 9. County of Ventura Codes and Regulations.
- B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply. In instances where plans and specifications are at variance or conflict the most restrictive requirement shall apply. Contractor shall be responsible for all his associated work and materials and also the work and materials of related or affected trades.
- C. Contractor's Expense: Obtain and pay for all required bonds, insurance, licenses, and pay for all taxes, fees and utility charges required for the electrical work.
- D. Testing and Adjustment:
1. Perform all necessary tests required to ascertain that the electrical system has been properly installed, that the power supply to each item of equipment is correct, and that the system is free of grounds, ground faults, and open circuits, that all motors are rotating in the proper directions, and such other tests and adjustments as may be required for the proper completion and operation of the electrical system. Contractor shall provide a copy of all test reports to prove these tests have been performed.
 2. If, during the course of testing, it is found that system imbalance is in excess of 20%, rearrange single-pole branch circuit in lighting and receptacle panels to bring system balance to within 20% on all phases. Record all such changes on the typewritten panelboard schedule and submit a summary of changes to the Engineer on the record drawings.

1.06 SUBMITTALS

- A. Procedure: In accord with the Submittal Section.
- B. Shop drawings: Detailed shop drawings for the following equipment:
1. Distribution panelboards.
 2. Branch circuit panelboards.

3. Circuit breaker.
 4. Cable trays and accessories.
 5. Switchboards.
 6. Ground fault protection.
 7. Fire alarm system.
 8. Motor control centers.
 9. Contactors and cabinet.
 10. Low voltage cabling riser diagram
- C. Product data: Detailed manufacturer's data for:
1. Cabinets.
 2. Concrete pull boxes.
 3. Disconnects.
 4. Lighting fixtures and associated equipment including control.
- D. Test results for the following:
1. Fire alarm system.
 2. Circuit breakers.
 3. Grounding systems.
 4. Cables.
- E. Include sufficient information to indicate complete compliance with Contract Documents. Include illustrations, catalog cuts, installation instructions, drawings, and certifications. On each sheet show manufacturer's name or trademark.
- F. Operating, maintenance, and instruction data for:
1. Fire Alarm and detection.

G. Instruction materials:

1. Provide at the time of personnel instruction period three bound copies of instruction manuals for the systems as listed in Subparagraph 1.04.A.4.f.
2. Include the following (minimum) information in each copy of instruction manual:
 - a. Manufacturers' names and addresses including phone numbers.
 - b. Serial numbers of items furnished.
 - c. Catalog cuts, exploded views and brochures, complete with technical and performance data for all equipment, marked to indicate actual items furnished and intended use.
 - d. Recommended spare parts.

1.07 OWNER'S PERSONNEL INSTRUCTIONS

- A. Prior to completion of the contract, and at the Owner's convenience, instruct verbally and demonstrate to the Owner's personnel, the operation of the systems as listed under operating, maintenance, and instructional data and/or emergency generator, automatic transfer switch and fire alarm annunciator panel.

1.08 CLEANING

- A. Clean exterior surfaces and interiors of equipment and remove all dirt, cement, plaster and other debris. Protect interior of equipment from dirt during construction and clean thoroughly before energizing.
- B. Clean out cracks, corners and surfaces on equipment to be painted. Remove grease and oil spots so that paint may be applied without further preparation.

1.09 PROJECT RECORD DOCUMENTS - Prepare the following and submit to the engineer before final acceptance:

- A. Mark Project Record Documents daily to indicate all changes made in the field.
 1. In addition to general requirements of Project Record Drawings, indicate on drawings, changes of equipment locations and ratings, trip sizes, and settings on circuit breakers, alterations in raceway runs and sizes, changes

in wire sizes, circuit designations, installation details, one-line diagrams, control diagrams and schedules.

- B. Use green to indicate deletions and red to indicate additions.
 - 1. Use the same symbols and follow the same drafting procedures used on the Contract Drawings.
- C. Locate dimensionally off of contract drawings all underground conduit stubbed-out for future use, underground feeder conduits, and feeder pull box locations using building lines by indicating on the Project Record Drawings.
- D. At the completion of underground conduit installation provide underground conduit record documents to owner's representative.
- E. Two copies, in binder form, of all test results as required by these specifications - 260030.
- F. Two copies of local and/or state code enforcing authorities final inspection certificates.
- G. Two copies, in binder form, of electrical equipment cut sheets, manufacturer's installation instructions, warranty certificates, and product literature for all products utilized on project.

1.10 SERVICE INTERRUPTIONS AND UTILITY

- A. Coordinate with the Owner the interruption of services necessary to accomplish the work.
- B. Coordinate with the utility company all work associated with power and communications distribution systems and service entrance equipment.
- C. Electrical contractor shall supply temporary power for all trades.

1.11 MINIMUM SPECIFICATION REQUIREMENTS (ALL WORK OF DIVISION 260000)

- A. As a minimum Specification requirement, all materials and methods shall comply with applicable governing codes.

1.12 PENETRATION SEALING

- A. Seal penetration through exterior walls and fire rated walls, floors, ceilings, and roofs with 3M Firestopping materials of fire rating capacity rated per architectural plans and UBC or prevailing building code requirements.

1.13 PLACING EQUIPMENT IN SERVICE

- A. Do not energize or place electrical equipment in service until all interested parties have been duly notified and are present or have waived their rights to be present. Where equipment to be placed in service involves service or connection from another contractor of the owner, notify the owner in writing when the equipment will be ready for final testing/connection and schedule to the owner's satisfaction of this service connection. Notify the owner two weeks in advance of the date the various items of equipment will be complete.

1.14 OWNER-FURNISHED ITEMS

- A. Pick up Owner-furnished items and handle, deliver, install, and make all final connections.
 - 1. Assume responsibility for the items when consigned at the storage facility or in the field in accord with requirements of the Contract Documents.

1.15 ELECTRIC ITEM LOCATION

- A. Electrical drawings are generally diagrammatic. Verify equipment sizes with shop drawings and manufacturers' data and coordinate location layout with other trades. Notify owner and engineer of any changes of location requirements prior to installation and obtain engineer's written acceptance for all changes/revisions.

1.16 DEMOLITION

- A. Scope: Provide and perform demolition, preparatory and miscellaneous work as indicated and specified, complete.
- B. Principle Items of Work:
 - 1. Demolition and removal of existing electrical conduit, wiring and equipment required to complete the project.

2. Preparation of the existing building to receive or connect the new work.
 3. Miscellaneous demolition, cutting, alteration, and repair work in and around the existing building necessary for the completion of the entire project.
 4. Disconnecting and reconnection of electrical equipment as required by the construction modifications.
- C. Existing Conditions: Make a detailed survey of the existing conditions pertaining to the work. Check the locations of all existing structures, equipment and wiring (branch circuiting and controls). Provide at bid time any exclusions for existing conditions work.
- D. Salvage and Disposal: All removed material other than items to be reused shall be returned to the owner or disposed of in accordance with instructions from the owner's representative. Disposal shall be done in accordance with EPA and governing body requirements and regulations. Contractor shall pay all fees and charges for disposal.

1.17 ELECTRICAL WORKMANSHIP REQUIREMENTS

- A. It is required that all electrical construction of this Contract be performed by journeyman electricians. All journeyman electricians shall have a minimum of 4 years of apprenticeship training and hold a valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards. This is intended to mean that a person who does not hold a valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards will not be permitted to do electrical work of any kind that involves new construction, nor make repairs, alterations, additions, or changes of any kind to any existing system of electrical wiring, apparatus, equipment, light, heat, or power.
- B. Contractor may employ electrical helpers or apprentices on any job of electrical construction, new or existing, when the work of such helpers or apprentices is performed under direct and constant personal supervision of a journeyman electrician holding a valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards.

1. Each journeyman electrician will be permitted to be responsible for quality of workmanship for a maximum of eight helpers or apprentices during any same time period, provided the nature of work is such that good supervision can be maintained and quality of workmanship achieved is the best, as expected by Owner and as implied by the latest edition of the California Electrical Code (National Electrical Code with State of California amendments).
 2. Before each journeyman electrician commences work, deliver to Owner at project site a photocopy of journeyman's valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards.
- C. All electrical systems shall be installed in a neat and workmanlike manner per National Electrical Code requirements and ANSI approved NEIS National Electrical Installation Standards.

1.18 DESIGN CHANGES AFTER AWARD OF BID

- A. When a change in the quantity or size of conductors is made, the conduit size will remain in accordance with that indicated in the original contract drawings rather than the drawing symbol conduit table. When code permits, provide conductor insulation 'THWN' where required to maintain conduit fill conformance with the National Electrical Code.

1.19 MATERIAL AND EQUIPMENT SUBSTITUTION

- A. Where two or more trade names or manufacturers are mentioned, selection shall be made from the group listed for use in the base bid. The order in which names are listed is not intended to be any indication of preference.
- B. Where a single manufacturer, product or trade name is stated, that manufacturer, product or trade name shall be used in the base bid. The use of other manufacturers, products or trade names will be considered by the engineer of record (unless that product is indicated for no substitution) only if submitted as alternate items at the time of bidding, with evidence of equality and a statement of net price difference as compared to the specified item. After approval by the engineer of record, the architect and owner reserve the right to review such submittals and to determine the acceptability for use.

- C. Equipment other than that specified will be accepted only when written approval is given by the engineer of record and architect, in accordance with Division 1.
- D. The contractor shall be held responsible for all physical changes in piping, equipment, etc. resulting from equipment substitution and likewise bear any increased cost of other trades in making said substitution. Approval by the architect of equipment other than that specified does not relieve this contractor of this responsibility.

1.20 REQUESTS FOR INFORMATION

- A. The contractor shall submit all requests for information (RFI's) typewritten on the attached form.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION

SECTION 26 0030

TESTS AND IDENTIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Tests and identification.

1.02 SUBMITTALS

- A. In accord with Section 260000.
- B. All test values.

1.03 DEFINITION

- A. Circuit designation: This term is construed to mean panel designation and circuit number; i.e., LA-13.

1.04 TESTS AND ADJUSTMENTS

- A. Prior to energizing, test all systems. Test to ensure systems are:
 - 1. Free from short circuits and grounds.
 - 2. Free from mechanical and electrical defects.
- B. Circuit breakers (main and feeder circuits that are adjustable only): Testing and adjustments of circuit breakers shall be made by Owner-approved independent testing firm. Testing firm shall meet the criteria for full membership of the International Electrical Testing Association (NETA).
 - 1. Visual and mechanical inspection:
 - a. Compare nameplate data with Drawings and Specifications.
 - b. Inspect circuit breaker for correct mounting.
 - c. Operate circuit breakers to ensure smooth operation.
 - d. Inspect case for cracks or other defects.

- e. Verify tightness of accessible bolted connections and/or cable connections by calibrated torque-wrench method in accord with manufacturer's published data.
 - f. Inspect mechanism contacts and arc chutes in unsealed units.
2. Electrical tests:
- a. Perform a contact-resistance test.
 - b. Perform an insulation-resistance test at 1000 volts dc from pole-to-pole and from each pole-to-ground with breaker closed and across open contacts of each phase.
 - c. Perform adjustments for final settings in accord with coordination study supplied by Owner.
 - d. Perform long-time delay time-current characteristic tests by passing 300% rated current through each pole separately with ground fault functions defeated.
 - e. Determine short-time pickup and delay by primary current injection.
 - f. Determine ground-fault pickup and time delay by primary current injection. This test shall be done after short time and instantaneous testing are complete.
 - g. Determine instantaneous pickup current by primary injection using run-up or pulse method.
 - h. Verify correct operation of any auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, and anti-pump function.
3. Test values:
- a. Record all test values "as-found" and "as-left" conditions and provide certified copies to Owner.
 - b. Compare microhm or millivolt drop values to adjacent poles and similar breakers. Investigate deviations of more than 25%. Investigate any value exceeding manufacturer's recommendations.
 - c. Insulation resistance shall not be less than 100 megohms.

- d. Trip characteristic of breakers shall fall within manufacturer's published time-current characteristic tolerance band, including adjustment factors. Circuit breakers not within tolerance band shall be tagged defective.
- C. Adjust all installation and equipment for their intended use and rating as defined in manufacturer's specifications and test procedures.
 1. Contractor recognizes and understands that the show and character lighting, electronic control equipment, special effects, etc., must have a minimum 4-week adjustment period, occurring after installation and verification of said equipment, for each area or facility. Contractor shall provide appropriate personnel (i.e., electricians, carpenters, laborers) as necessary to support Owner during this adjustment period. Adjustment is defined as orientation of adjustable lighting fixtures, installation of color filters to any lighting fixtures requiring same, location adjustment 6 ft., control system setting including programming of control functions, system debugging (i.e., cross-wiring). Contractor shall assume day and night activities during the adjustment period.
- D. Adjust transformer taps under full load operating conditions, to provide nominal operating voltages at the loads.
- E. Hi-Pot test procedures:
 1. Test 25 pair, 10 pair, or 4 pair, multi-conductor cables installed in conduit, in the following manner and in presence of Owner:
 - a. Special Owner-furnished equipment: Hi-Pot Cable Tester & Adapters Model 500.
 - b. Perform visual inspection to verify:
 - 1) Proper cable identification tags are installed.
 - 2) Connector is installed properly and screws and clamps properly tightened.
 - 3) Elco connector is keyed correctly.
 - c. Continuity and Hi-Pot:
 - 1) Using the Hi-Pot cable tester and all necessary adapters:

- a) Set tester on 1500 VDC, S.C. (short continuity), 50 pos.
 - b) Hook up cable to "Y" adapter if testing a cable in a conduit or tray.
 - c) Attach turnaround Elco test plug to opposite end of cable to be tested.
 - d) Attach ground lead of tester to center metal hold-down screw of Elco connector.
 - e) Push reset button until tester dial points to zero. Release reset button.
 - f) Press start button. Tester will step through all pairs and stop at bottom half of dial. This is because when using the turnaround plug, tester is checking 2-pair runs.
- d. Error indication:
- 1) No-error dial will make 1/2 revolution and stop. Press reset button. Tester will step to top position.
 - 2) Fault lights "short" or "open" dial will stop at a pin location indicated on face plate of dial. See chart on side of unit to give correct pin assignments. Press start buttons. Tester will step on through. If another "short" or "open" is found, tester will halt again.
- e. Fault correction:
- 1) When a fault is indicated, remove both connector shells of cable under test and check indicated pins.
 - 2) Repair fault using procedure steps as specified in Section 16121, paragraph "Repairing damaged pin-wire assembly."
- f. Marking of accepted cable:
- 1) Record acceptance of all cables on inspection copy of cable schedule provided by Owner's representative, and submit in accord with Section 260010.

- 2) Place inspection stamp of Owner or dot sticker with initials on either white cable tag indicating cable assembly, or on connector shell.

F. Ground systems:

1. Visual and mechanical inspection: Verify ground system is in compliance with Drawings and Specifications.
2. Electrical tests:
 - a. Perform fall-of-potential test or alternative in accord with IEEE 81 on the main ground electrode or system.
 - b. Perform point-to-point tests to determine resistance between main ground system and all major electrical equipment frames, system neutral, and/or derived neutral points.
3. Test values:
 - a. Resistance between main ground electrode and ground shall be no greater than 10 ohms. Additional rods shall be installed and bonded to grounding system and driven to a depth of 50 ft. or refusal, whichever comes first.
 - b. Investigate point-to-point resistance values which exceed 0.5 ohm.
 - c. Record all test values and provide certified copies to Owner.

G. Cables:

1. Make insulation resistance tests on all power cables, using a self-contained instrument such as the direct-indicating ohmmeter of the generator type, or “megger” such as manufactured by J.G. Biddle Company, or Owner-approved equivalent. Insulation resistance values shall be at least 75% of shop test records.
 - a. Apply the following test voltages for 1 minute, except where specified otherwise herein, in accord with procedure recommended by manufacturer of test equipment and as specified herein.

Minimum Rated Circuit Voltage (DC)	Megger Reading	Megger
--	-------------------	--------

600 volts	500 volts	600 kilohms
1000 volts	500 volts	1 megohm
15,000 volts	1000 volts	15 megohms

2. Record all test values and provide certified copies to Owner.
3. Replace cables not meeting specified resistance values.

H. Miscellaneous tests:

1. Wiring: check all control circuits for continuity and conformance with wiring diagrams furnished by Owner and manufacturers.
2. Polarity tests: Make continuity and polarity tests on all current and potential transformers to determine whether polarity is as indicated on drawings, and the circuit is continuous.
3. Phasing tests: Identify phases of all switchgear and power cables by stenciling switchgear and tagging cables with approved tags, so that phases can be identified for connecting to proper phase sequence.

1.05 LABELING AND IDENTIFICATION

- A. Provide engraved plastic nameplates on all electrical distribution equipment shown on single-line diagram, and on control panels, dimmer panels, terminal cabinets, and separately mounted circuit breakers, disconnects, and starters.
- B. Provide equipment and circuit designation on nameplates with minimum letter and plate sizes as indicated.
- C. Provide engraved plastic nameplates with 1/4 in. minimum height letters indicating:
 1. Circuit designation at branch overcurrent devices in distribution panelboards, switchboards, and motor control centers.
 2. Circuit designation of panel, equipment-controlled or device-controlled on disconnect switches and on circuit breakers, starters, and controls which are individually enclosed.
 3. Voltage rating and circuit designation of all outlets larger than 120V, 20A rating and more than 2 poles.
 4. Designation of control and terminal cabinets including CUTC, as indicated.

5. Designation of each contactor and relay in control cabinets.
 6. Designate area controlled for each dimmer in dimmer cabinet or rack.
 7. Circuit designation at all ground fault detectors and ground fault test receptacles.
 8. Equipment designation on front of switchboards, distribution panelboards, branch circuit panelboards, and load centers.
- D. Secure nameplates with at least two rivets. Cementing and adhesive installation is not acceptable.
- E. Provide two copies of a typewritten directory for each branch circuit panelboard, showing each circuit and its use. Attach one copy to panelboard door and deliver the other copy to Owner.
- F. Provide caution label on branch circuit panelboards with integral control compartments. Caution label shall be red with white letters reading "CAUTION, EXTERNAL CONTROL VOLTAGE CIRCUIT WITHIN THIS PANEL."
- G. Conductor identification:
1. Feeders: Identify with the corresponding circuit designation at over-current device and load ends, at all splices, and in pull boxes.
 2. Branch circuits: Identify with corresponding circuit designation at overcurrent device and at all splices.
 3. Control wires: Identify with indicated number and or letter designation at all terminal points and connections, including manufacturer pre-wired control sections and cabinets.
 4. Alarm and detection wires: Identify with indicated wire and mnemonics numbers at all connections, terminal points, and coiled conductors within cabinets for future termination by Owner.
 5. For identification of conductors, use heat shrinkable white marking sleeves such as Brady Permasleeve with type written identification.

END OF SECTION

SECTION 26 0050
BASIC ELECTRICAL MATERIALS & METHODS

PART 1 - GENERAL

- 1.01 DESCRIPTION: Division 1 applies to this Section. This Section contains general requirements for the Sections in Division 26.
- A. Related Work Not in Division 26: Refer to individual Division 26 Sections.
- 1.02 QUALITY ASSURANCE:
- A. Codes: Entire installation shall comply with requirements of authorities having jurisdiction.
- B. Permits: Contractor shall pay for all permits required by work under this Division.
- C. Inspections: Contractor shall arrange for all inspections and correct non-complying installations.
- 1.03 SUBMITTALS: Refer to Division 1 for procedures.
- A. Material and Equipment: Prior to start of work, 6 copies of a list of all materials and equipment covered by Division 26 shall be submitted for approval. Contractor shall allow ample time for checking and processing and shall assume responsibility for delays incurred due to rejected items. No installation of material concerned shall be made until such written approval has been obtained. Approval of materials and equipment shall in no way obviate compliance with the Contract Documents. Each item proposed shall be referenced to the applicable Section, Page, and Paragraph of Division 26. For each item proposed, give name of manufacturer, trade name, catalog data, and performance data.
- B. Equipment Layout Drawings: Submit "Equipment Layout Drawings" for each equipment room or area containing equipment items furnished under this Division. Layout Drawings shall consist of plan view of room, to scale, showing projected outlines of all equipment, complete with dotted line indication of all required clearances including all those needed for removal or service. Location of all conduit and pull boxes shall be indicated.
- C. Service Manuals: Refer to Submittal Section. Indexed Service Manuals shall be submitted which shall include test reports, service instructions, and renewal parts lists of all equipment.
1. Submission and Information: Service Manuals shall be submitted for approval at least 30 days before final inspection. The following information together with any pertinent data, shall be included in Service Manual:

- a. Renewal part numbers of all replaceable items.
 - b. Manufacturer's cuts and rating data.
 - c. Serial numbers of all principal pieces of equipment.
 - d. Supplier's name, address, and phone number.
 - e. Final settings for all breakers, relays, and control devices (See Section 26032).
2. Copies: Four (4) copies of approved Service Manual shall be delivered on or before date required.
- D. Record Drawings: Prepare and submit in accordance with requirements. Contractor shall make notations, neat and legible, daily as the work proceeds. Drawings shall be available for inspection at all times and kept at the job site. All buried conduit and/or indicated future connections outside any building shall be located both by depth and by accurate measurement from a permanently established landmark such as a building or structure.
- E. Seismic Calculation: Refer to Article 3.01 herein.
- F. Spare Parts: Conform to the Submittal Section. Deliver following spare parts to Owner and obtain receipts. Submit at same time as Operating Instructions:
- 1. Spare fuses; 1 set for each combination fuse breaker.
 - 2. Spare pilot light lamps of each type used on project, in quantity of 10%, but not less than 2%.
 - 3. Overload heater elements; 2 sets for each size used on project.
- G. Special Tools: If any part of the equipment furnished under Division 26 requires a special tool for assembly, adjustment, resetting, or maintenance thereof and such tool is not readily available on the commercial tool market, it shall be furnished with the equipment as a standard accessory and delivered to the Owner.
- H. Maintenance Paint: One (1) can of touch-up paint shall be delivered to Owner for each different color factory finish which is to be the final finished surfaces of the product.

1.04 DRAWINGS:

- A. Diagrammatic Drawings: For purposes of clarity and legibility, drawings are essentially diagrammatic although size and location of equipment is drawn to scale wherever possible, Contractor shall make use of data in all the Contract Documents and verify information at building site.
- B. Routing of Conduit and Piping: The drawings indicate required size and termination of conduits and raceways. It is not intent to indicate all necessary offsets and it shall be the responsibility under this Division to install conduit in

such a manner as to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and make all equipment requiring inspection, maintenance and repair accessible without extra cost to the Owner.

- C. Coordination with Other Trades: Check with other Divisions of the Specifications so that no interference shall occur and in order that elevations may be established for the work. Installed work which interferes with the work of other trades shall be removed and rerouted at the discretion of the Architect.

1.05 DAMAGE AND REPAIRS:

- A. Emergency Repairs: Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding Contractor's warranty or relieving Contractor of his responsibility during warranty period.
- B. Responsibility for Damage: Contractor shall be responsible for damage to grounds, buildings, or equipment due to work furnished or installed under this Division 26.

1.06 PROTECTION, CARE, AND CLEANING:

- A. Protection: Provide adequate protection for finished parts of materials and equipment against physical damage from any cause during progress of work and until final completion. Sensitive electrical equipment shall not be installed until major construction is completed.
- B. Care: During entire construction, properly cap all lines and equipment to prevent entrance of sand and dirt. Protect equipment against moisture, plaster, cement, paint or work of other trades by covering with polyethylene sheets.
- C. Cleaning: After installation is completed, clean all systems as follows in addition to requirements specified:
 - 1. Field Painted Items: Clean exterior of conduits, raceways, piping and equipment exposed in completed structure; removing all rust, plaster, cement and dirt by wire brushing. Remove grease oil and similar materials by wiping with clean rags and suitable solvents.
 - 2. Factory Finished Items: Remove grease and oil on all factory finished items such as cabinets and controllers, and leave surfaces clean and polished.
- D. Connection: Prior to energizing, check all electrical connection hardware and torque where necessary.

PART 2 - PRODUCTS

- 2.01 PRODUCTS: Products and materials shall be as specified in the pertinent Sections of Division 26.

- 2.02 MATERIALS AND EQUIPMENT: Wherever possible, all materials and equipment used in installation of this work shall be of same manufacturer throughout for each class of material or equipment. Materials shall be new and bear UL label, wherever subject to such approval. Comply with ANSI, IEEE and NEMA standards, where applicable.

PART 3 - EXECUTION

- 3.01 SEISMIC REQUIREMENTS: Electrical equipment for emergency systems shall be braced to withstand the lateral forces that result from earthquakes. Under Work of Division 26, submit seismic calculations stamped and signed by a registered California structural engineer confirming size, number, and location of required anchoring hardware. Electrical equipment vendors shall furnish weights together with dimensions and the center of gravity location for all emergency electrical equipment for this purpose.
- 3.02 GENERAL LATERAL BRACING REQUIREMENTS: As shown on Drawings. Additional bracing requirements shall conform to specific requirements shown on Drawings or in other Sections of Division 26. Anchorages for equipment subject to thermal expansion and movement shall conform to manufacturer's recommendation and intent of general bracing requirements. When general and specific bracing requirements enumerated above are in conflict with referenced standards, the most stringent requirements shall govern.
- 3.03 EXCAVATION AND BACKFILL: Perform all excavation and back fill required to install Work of Division 26, both inside and outside. Perform all excavation and backfilling in accordance with Division 2.
- A. Excavation: Bury conduits outside building to a depth of not less than 24" (or as required by Code) below finish grade, unless noted otherwise.
 - B. Backfilling: Do not backfill until after final inspection and approval of conduit installation by all legally constituted authorities and recording of the buried items on the Record Drawings.
- 3.04 CUTTING AND PATCHING:
- A. Cutting of Existing Structural Work: Holes in existing slabs and concrete walls shall be cored to the minimum size required. The Contractor shall submit Drawings showing dimensioned sizes and locations for all such holes to Architect for approval before cutting. Where required for conduit installation, slabs on grade shall be saw-cut to minimum required width; submit cutting Drawings to the Architect for approval before cutting.
 - B. Patching: Holes or chases shall be patched to match adjacent surfaces.
- 3.05 CONCRETE WORK: Concrete construction required for the Work of Division 26 shall be provided under the Work of Division 26.

- 3.06 PAINTING: Finish painting of electrical equipment will be as specified in Division 9, unless equipment is herein specified to be furnished with factory applied finish coats. Equipment to be field painted shall be furnished with a factory applied prime coat.
- A. Touch-Up: If factory finish on any equipment furnished under Division 26 is damaged in shipment or during construction of building, the equipment shall be refinished by Contractor to satisfaction of Architect.
 - B. Concealed Equipment: Uncoated cast-iron or steel that will be concealed, or will not be accessible when installations are completed, shall be given one heavy coat of black asphaltum before installation.
- 3.07 OPERATING INSTRUCTIONS: Contractor to provide services of an experienced Engineer to instruct Owner in operation of entire installation. Instructional period shall be during normal work day hours. This instruction period may be simultaneous with compliance tests.
- 3.08 COMPLIANCE TESTS: Conduct such tests of all portions of installation as may be necessary to ensure full compliance with the Drawings and Specifications. Tests shall be made in the presence of the Owner. Costs of test shall be borne by Contractor and Contractor shall provide all instruments, equipment, labor and materials to complete all the tests. Tests may be required on any item between installation of Work and the end of 1 year warranty period. Should these tests develop any defective materials, poor workmanship or variance with requirements of Specifications, Contractor shall make any changes necessary and remedy any defects at his expense.
- A. All Feeders: Measure and record as follows:
 - 1. 600 volt conductors shall be tested with 500 volt megger to ground on each phase. megger to be on test for one minute before any readings are taken. The minimum values on all feeders shall be 100,000 OHMS.
 - 2. Copies of the certified test readings shall be transmitted to Owner.
- 3.09 SYSTEM ACCEPTANCE:
- A. Final Review: The Contractor shall request a final review prior to system acceptance after:
 - 1. Completion of installation of all systems required under the Contract Documents.
 - 2. Submission and acceptance of operating and maintenance data.
 - 3. Completion of identification program.
 - B. Acceptance: Is contingent on:
 - 1. Completion of final review and correction of all deficiencies.

2. Satisfactory completion of acceptance tests demonstrating compliance with all performance and technical requirements of Contract Documents.
3. Satisfactory completion of training program and submission of manuals and Drawings required by Contract Documents.

3.10 PRELIMINARY OPERATION: The Owner reserves the right to operate portions of the electrical system on a preliminary basis without voiding the warranty or relieving the Contractor of his responsibilities.

3.11 CLEAN-UP: Conform to the Submittal Section. Upon completion and at other times during progress or Work, when required, remove all surplus materials, rubbish, and debris resulting from Work of Division 26.

END OF SECTION

SECTION 26 0060

MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner and Architect/Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect and make safe all electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with Utility Company and Owner's representative.
- C. Provide temporary wiring and connections to maintain required existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

10/01/2011

CDC MODULAR CLASSROOM AND SHADE STRUCTURES
VENTURA COLLEGE - VCCCD

MINOR ELECTRICAL DEMOLITION FOR REMODELING

26 0060-1

- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area when outage affects business operation.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner and local fire service at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service and new system is accepted. Disable system only to make switchovers and connections. Notify Owner and Telephone Utility Company at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- G. Existing Security System: Maintain existing system in service until new system is complete and ready for service and new system is accepted. Disable system only to make switchovers and connections. Obtain permission from the Owner and security company at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply and re-label devices as spares.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- I. Disconnect and remove abandoned conduit.
- J. Repair adjacent construction and finishes damaged during demolition and extension work.
- K. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- L. Extend existing installations using materials and methods compatible with existing electrical installations, and in compliance with new project specifications.
- M. Modify existing as-built drawings to note changes.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts, and broken electrical parts.

3.05 INSTALLATION

- A. Install relocated materials and as required by this section and Owner's representative.

END OF SECTION

SECTION 26 0111

CONDUITS

PART 1 - GENERAL

- A. The general provisions apply to this section.

1.01 WORK INCLUDED

- A. Conduits; including:
 - 1. Rigid steel conduit.
 - 2. Intermediate metal conduit (IMC).
 - 3. Electrical metallic tubing (EMT).
 - 4. Rigid aluminum conduit.
 - 5. Polyvinyl chloride conduit (PVC).
 - 6. Flexible metal conduit.
 - 7. Liquid-tight flexible metal conduit.

1.02 DEFINITION

- A. Conduit: This term shall be construed to mean conduit and conduit fittings; and tubing and tubing fittings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Support material: Section 260190.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION - ALL MATERIALS SHALL BE MANUFACTURED IN THE USA.

- A. Rigid Steel Conduit: Hot-dipped galvanized or sherardized including the threads, manufactured in accordance with ANSI C80.1 and UL6.

1. Threaded, hot-dipped galvanized or sherardized fittings manufactured in accordance with ANSI C80.4.
- B. Intermediate Metal Conduit: Hot-dipped galvanized including the threads, manufactured in accordance with UL 1242.
- C. Electrical Metallic Tubing: Manufactured in accordance with ANSI C80.3 and UL 797.
 1. Provide compression fittings in walls, ceiling spaces or exposed construction areas.
 2. Provide compression (water tight) fittings in damp areas or areas exposed to weather.
- D. Rigid Aluminum Conduit: Manufactured in accordance with ANSI C80.5.
 1. Threaded fittings, manufactured in accordance with ANSI C80.4.
- E. Polyvinyl Chloride Conduit: Schedule 40 and schedule 80, manufactured in accordance with ANSI C33.91, UL 651, and Nema TC-2.
 1. Cemented type fittings of the same manufacturer as the conduit.
- F. Polyvinyl Chloride Conduit: Type EB, heavy wall, manufactured in accordance with ANSI C33.91, UL651, and Nema TC-8.
 1. Cemented fittings of the same manufacturer as the conduit.
- G. Flexible Metal Conduit: Hot-dipped galvanized steel, manufacturer in accordance with UL 1.
 1. Squeeze type, malleable iron, cadmium plated, straight and angle connectors for all sizes and twist-in connectors for 1/2-inch and 3/4-inch flexible metal conduit.
- H. Liquid-Tight Flexible Conduit: Hot-dipped galvanized with liquid-tight vinyl jacket.
 1. Liquid-tight fittings.

PART 3 - EXECUTION

3.01 USE

- A. EMT for all exposed and concealed work except as indicated in Paragraphs B, C, D, E, F, and G.
- B. Rigid steel, IMC, or rigid aluminum conduit in areas where exposed conduit could be subject to physical damage or where conduit is exposed and conductor phase to ground voltage exceeds 300 volts.
- C. Rigid aluminum conduit may be used for all feeder runs exposed or concealed in stud walls and spaces above suspended ceilings.
- D. PVC Conduit:
 - 1. Schedule 40 for runs below grade in direct contact with earth.
 - 2. Schedule 40 in concrete floors, walls or roofs.
- E. Flexible Conduit (steel only permitted):
 - 1. For connection to equipment subject to vibration, maximum length 18 inches. In wet locations use liquid-tight flexible conduit.
 - 2. For connection to lighting fixtures above suspended ceilings. Lengths limited to 72 inches.
 - 3. Install ground conductors in all flexible conduits.
- F. Where 3/4-inch conduit runs are concealed in walls or ceilings and these runs are through wood studs and wood joists, flexible steel conduit may be used up to a maximum length of 6'0".
- G. All risers shall be PVC coated RGS with bushings.
- H. In concrete or below grade use conduit not smaller than 1 inch. Maximum size in concrete slab: 1 inch. Run larger sizes under slab.
- I. Use long sweep elbows with minimum radius 10 times nominal conduit diameter for all telephone and communication runs.

3.02 INSTALLATION

- A. Provide conduit support and bracing in accordance with the latest published SMACNA guidelines.
- B. Perform excavating, trenching, backfilling, and compacting as specified in Division 2.

- C. Minimum cover for runs below finished grade outside buildings: 24 inches except where noted or required by the serving utility. Minimum cover for conduit in

concrete floors, walls or roof: 1/3 thickness of slab. Minimum cover under building slabs is 12-inches.

- D. Minimum separation from uninsulated hot water pipes, steam pipes, heater flues or vents: 6 inches. Avoid running conduit directly under water lines.
- E. Protect inside of conduit from dirt and rubbish during construction by capping all openings with plastic caps intended for the purpose.
- F. Provide conduit bodies for exposed conduit runs at junctions, bends or offsets where required. Do not use elbows or bends around outside corners of beams, walls or equipment. Make conduit body covers accessible.
- G. Make conduit field cuts square with saw and ream out to full size. Shoulder conduits in couplings.
- H. Run a minimum of one 3/4-inch empty conduit for every three single pole spare circuit breakers, spaces or fraction thereof and not less than two 3/4-inch conduits from every flush mounted panel to an accessible space above the ceiling and below the floor.
- I. Make conduit projections from covered areas to areas exposed to the weather watertight by proper flashing. Extend flashing a minimum of 6 inches in all directions from conduit.
- J. Where conduit is to remain empty, install polypropylene or nylon pull-line 3/16" minimum diameter from end to end with tag at each end designating opposite terminations.
- K. Run conduit parallel and at right angle to building lines, when visible in finished construction.
- L. Cap conduits indicated to be stubbed-out underground using glued-on PVC caps intended for this purpose.
- M. Install a coupling flush with the floor on all conduits stubbed up through floors on grade.
- N. Make no bends with a radius less than 12 times the diameter of the cable it contains nor more than 90 degrees. Make field bends with tools designed for conduit bending. Heating of metallic conduit to facilitate bending is not permitted.

- O. Where conduit installed in concrete or masonry extends across building construction joints, provide expansion fittings as manufactured by O.Z.; Crouse-Hinds; Appleton; or equal, with approved ground straps and clamps.
- P. Concrete Wall or Slab Penetrations: All core drilling, sleeves, blockouts or other penetrations must be approved by the Structural Engineer prior to installation.
 - 1. Space sleeves and core drills to insure a minimum dimension of 3 times the nominal trade diameter of the largest adjacent conduit between sleeves or core drills.
 - 2. Use blockouts for concentrations of conduits in a confined area.
- Q. Do not penetrate walls with flexible conduit where subject to physical damage. Use recessed box with extension ring for transition from interior to exterior of wall.
- R. All homeruns shown shall be run to the panel indicated independently of all other homeruns. Provide pull points so as not to exceed total bends of 360 degrees between them unless otherwise indicated.
- S. At switchboards, manholes and floor standing distribution panelboards, provide insulated throat bushings or bell ends on all non-metallic conduit entries and bushings on all metallic conduit entries.
- T. Provide bushings on all conduit terminations sized 1" and larger.
- U. Provide weatherproof boxes and connectors for all exposed parking structure raceways and boxes.
- V. Provide bell ends on all conduits into pullboxes and manholes, seal all conduits after conductors are pulled.
- W. Cap all unused conduits with end cap. Do not tape.
- X. All Fire Alarm Conduits shall be painted red.

END OF SECTION

SECTION 26 0120

CONDUCTORS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Conductors; for power, lighting, sound, communication and control, including conductors for general wiring, flexible cords and cables, and ground conductors.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 260000.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Conductors for General Wiring: Thermoplastic insulated rated for 600V manufactured in accordance with UL 83.
 - 1. Provide 3/4 hard drawn copper conductors. Provide solid conductor for #12 AWG and smaller. Provide stranded conductors for #10 AWG and larger.
- B. Conductor Connectors for General Wiring:
 - 1. Sizes No. 14 to No. 8: Splice with insulated spring wire connectors.
 - a. Ideal No. 451, 455 and 453.
 - b. Minnesota Mining: Types Y, R, G, and B.
 - c. Buchanan No. B1, B2 and B4.
 - 2. Size No. 6 or Larger, Copper: Splice and terminate with compression or pressure type connectors and terminal lugs.
- C. Provide connector sealing packs for all area lighting and exterior box splices which require complete protection from dampness and water.
 - 1. Scotchlok No.'s 3576, 3577 and 3578, by 3M Company.

PART 3 - EXECUTION

3.01 USE

A. Conductors for General Wiring:

1. Minimum 75 degrees C temperature rated insulation on conductors, except use minimum 90 degrees C temperature rated insulation on conductors in conduits exposed on roof, or where required due to ambient temperature.
2. Stranded conductors at motors, audio video and other applications where subject to vibration.
3. Minimum size conductors for power and lighting #12 AWG, except where noted.
4. Minimum size conductors for control circuits #14 AWG stranded with THHN/THWN insulation.

B. Use flexible cords and cables for connection of special equipment as indicated. Length not to exceed 72 inches.

C. Ground Conductors:

1. Provide an insulated green ground conductor for all branch circuit wiring where indicated.
2. Bare copper conductor may be used.
 - a. Install ground conductors in all non-metallic conduits as required by code. Install ground conductors in all motor branch circuits and all feeders. Where ground conductor size is not indicated, provide size as required for an equipment ground conductor by the National Electrical Code.
 - b. Install ground conductors in all flexible metal conduits.

D. Install XHHW – 2, 90°C copper conductors for all underground installations unless noted otherwise on the plans.

E. Install for all dimmers, stranded THHN/THWN – 2 copper 90°C conductors with dedicated neutrals.

3.02 INSPECTION

- A. Check conduit system for damage and loose connections, replace damaged sections.
- B. Check for caps at conduit openings. Make sure that inside of conduit is free of dirt and moisture.
- C. Pull mandrel, one size smaller than the conduit, through entire length of all underground conduits prior to conductor installation.

3.03 INSTALLATION

A. Conductors for General Wiring:

- 1. Color code conductors insulation as follows:

CONDUCTOR	SYSTEM 208Y/120	VOLTAGE 480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow

- 2. For conductors #6 AWG or larger, permanent plastic colored tape may be used to mark conductor in lieu of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.
 - a. Provide color tape on each end and at all terminal points and splices on wire enclosed in conduit.
 - b. Provide color tape every 3 feet on wire not enclosed in a listed wireway.
- 3. When pulling conductors, do not exceed manufacturer's recommended values.
- 4. Use polypropylene or nylon ropes for pulling conductors.

- B. Insulate splices with plastic electrical tape: Scotch No. 33+, Tomic No. 1T, or equal.
- C. Terminate all control wires with terminal lugs on terminal boards not designed with pressure plates. If splices are needed, use same procedure, installing a terminal board in a junction box for protection.
- D. All splices or connections shall be compression type Thomas & Betts or Burndy, no split bolt connections are allowed.

3.04 IDENTIFICATION

- A. Feeders: Identify with the corresponding circuit designation at over-current device and load ends, at all splices and in pull boxes.
- B. Branch Circuits: Identify with the corresponding circuit designation at the over-current device and at all splices and devices.
- C. Control Wires: Identify with the indicated number and/or letter designation at all terminal points and connections.
- D. Alarm and Detection Wires: Identify with the indicated wire and zone numbers at all connections, terminal points, and coiled conductors within cabinets.
- E. Conductors Terminated By Others: Indicate location of opposite end of conductor, i.e., Pull Box-Room 101.
- F. For identification of conductors, use heat shrinkable white marking sleeves such as Brady Permasleeve with type written identification.
- G. Circuit designation is construed to mean panel designation and circuit number, i.e., LA-13.

END OF SECTION

SECTION 26 0130
ELECTRICAL BOXES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Boxes; including:
 - 1. Outlet boxes.
 - 2. Pull and junction boxes.
 - 3. Cabinets.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 260000.
- B. Support Material: Section 260190.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Outlet Boxes:
 - 1. Pressed Steel Boxes: Knockout type, hot-dipped or electro-plate galvanized.
 - 2. Cast Iron Boxes: Hot-dipped or electro-plate galvanized with threaded hubs.
 - 3. Cast Iron Conduit Bodies: Hot-dipped or electro-plate galvanized with threaded hubs.
 - 4. Cast copper free aluminum conduit bodies with threaded hubs.
 - 5. Covers for Pressed Steel Boxes: Hot dipped or electro-plate galvanized.
 - 6. Outlet boxes manufactured in accordance with UL 514.
- B. Pull and Junction Boxes:

1. Sheet steel, hot-dipped or electro-plate galvanized, or prime coated and a final coat of manufacturer's standard enamel or lacquer finish. Manufactured in accordance with UL 50.
 - a. Where exposed to weather, provide raintight hubs for conduits entering the boxes, top and sides only.
 2. Floor Boxes:
 - a. Single gang, similar to Hubbell #B-2536.
 - b. Covers:
 - 1) Combination, similar to Hubbell #S-2525.
 - 2) Duplex receptacle, similar to Hubbell #S-3925.
 - c. Carpet flange, similar to Hubbell #S-3075 thru #S-3079.
 - d. Hubs: Provide hubs as required to suit the conduit arrangement.
 3. Pre-Cast Concrete Pull Boxes: As manufactured by Jensen Pre-Cast or Utility Vault and shown on drawings.
 4. High impact resistant PVC boxes: As manufactured by Carlon, Sedco, or R & G Sloan.
- C. Cabinets: Sheet metal, prime coat and final coat of manufacturer's standard enamel or lacquer finish. Manufactured in accordance with UL 50.
1. Control Cabinet: NEMA 1 enclosure, door with butt hinges and flush handle latches.
 - a. Provide with removable steel back panel.
 2. Terminal Cabinets: NEMA 1 enclosure, door with concealed hinges and spring catch type flush cylinder locks. Key locks alike, provide two keys with each lock.
 3. Provide engraved plastic nameplates with 1/2" minimum height letters indicating designation of control and terminal cabinets as shown on the drawings.
 - a. Secure nameplates with at least two screws or rivets. Cementing and adhesive installation not acceptable.

PART 3 - EXECUTION

3.01 USE

A. Outlet Boxes:

1. Ceiling Outlet Boxes: Not less than 4" octagonal by 2" deep.
2. FDD cast iron or cast aluminum device boxes and conduit bodies with metal covers for exposed conduit installation. Provide gasket for covers in wet areas.
3. Intercom, Microphone and TV Outlet Boxes: Not less than 4-11/16" square x 2-1/8" deep.
4. Provide floor boxes with quantity of gangs as required for power, communication or control as indicated. Use boxes with barriers where required. Provide carpet flanges in carpeted areas.

B. Pull and Junction Boxes:

1. Use sheet steel boxes NEMA Type 1 for indoor and NEMA Type 3R for outdoor installation, except as follows.
2. Use pre-cast concrete boxes for boxes flush in finish grade where requiring a nominal capacity greater than 144 cubic inches, where located in vehicular traffic areas, or where indicated.
3. Use polyvinyl chloride (PVC) boxes flush in finish grade when the nominal internal volume is less than or equal to 144 cubic inches or where indicated.
4. Use cast iron boxes for boxes flush in slab on grade.

3.02 INSTALLATION

- A. Provide 3/8" fixture studs in wall bracket and ceiling boxes.
- B. Provide covers suitable for the fixtures or devices used.
- C. Make outlet box covers flush with finished surfaces.
- D. Close unused open knockouts with knockout seals.
- E. Provide 1" deep plaster rings on recessed outlet boxes installed in areas where concrete will be exposed after construction is complete.
- F. Where boxes are concealed in exposed concrete unit masonry, use square cornered types or boxes fitted with rings of sufficient depth for the box to be recessed completely within cavity of block or tile. Install box to insure that ring fits an

opening sawed out of the masonry, so that no mortar is required to fill between ring and construction.

- G. Provide a 6" base of compacted crushed rock under pre-cast concrete pull boxes.
- H. Adjust floor boxes so they are level with top of finished floors.
- I. Provide pull boxes and junction boxes in all branch circuit and feeder runs as indicated. Do not provide pull boxes unless they are indicated or required by the Electrical Code.

3.03 IDENTIFICATION

- A. Junction Boxes: Use permanent black marker, 2" high lettering, and on each cover plate indicate the power source and circuits contained within that junction box.

END OF SECTION

SECTION 260140

WIRING DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Wiring devices.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Identification: Section 260030.
- B. Boxes: Section 260130.

1.03 Submittals

- A. In accord with Section 260010.

1.04 DEFINITION

- A. Wiring devices: This term includes all wall switches, pushbuttons, receptacles, and plates used for general purpose installation.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Wall switches:

1. Quiet toggle type, 20A – 120/277 VAC rated, with terminal screws to take up to No. 10 AWG conductors:

	SPST	DPST	3-WAY	SPST KEY SWITCH LOCK	4-WAY
Arrow-Hart	1991-I	1992-I	1993-I	1991-L	1994-I
Bryant	4901-I	4902-I	4903-I	4901-L	4904-I
General Electric	GE5951-2	GE5952-2	GE5953-2	GE5951-OL	GE5954-2
Hubbell	1221-I	1222-I	1223-I	1221-L	1224-I
Pass & Seymour/ Legrand	20AC1-I	20AC2-I	20AC3-I	20AC1-L	20AC4-I

2. Momentary contact type, 20A-120/277V, two-circuit, three-position, center off:

Arrow-Hart	1995-I
Bryant	4921-I
General Electric	GE5935-2
Hubbell	1557-I
Pass & Seymour/Legrand	1250-I

3. Passive infrared wall switch sensors: Ivory, 180° field of view, adjustable time out and ambient light, 1200 sq. ft. Coverage, 120 VAC, 60 Hz, 1500W. Maximum load, incandescent and fluorescent. As manufactured by Hubbell No. AT1201 or Owner- approved equivalent by Leviton or Pass & Seymour.
4. Fan speed controllers: AC unit rated 15A - 120V used to control up to twelve 56 in./52 in./48 in. ceiling fans or up to twenty 42 in. fans on a single circuit. Rinaudo's Reproductions No. 22394.

B. Passive infrared motion switching system:

1. Ceiling mount sensor, white, 500 sq. ft. coverage, requires control unit. Hubbell No. ATD500CRP.
2. Ceiling mount sensor, white, 2000 sq. ft. coverage, ceiling height dependent, requires control unit. Hubbell No. ATD2000CRP.
3. Ceiling or wall mount sensor, white, 1000 sq. ft. coverage, requires control unit. Hubbell No. ATD1000CRP.
4. Ceiling or wall mount hallway sensor, white, covers area 75 ft. long by 20 ft. wide, requires control unit. Hubbell No. PIR90HW1.
5. Low-voltage control unit, 120VAC, controls one to four sensors. Mount in 4 in. x 4in. enclosure. Hubbell No. CU120A.
6. Relay, 120VAC coil, used when load to be controlled exceeds capacity of a single circuit. Hubbell No. AAR

C. Receptacles, caps, and connectors:

1. 15A-125V, NEMA 5-15, parallel slot type with grounding pin:

	DUPLEX	SINGLE	GFI
Arrow-Hart	5252-I	5261-I	GF5242-I
Bryant	5252-I	5261-I	GFR52FT
General Electric	5252-2	5261-2	TGTR115F
Hubbell	5252-I	5251-I	GF5252-I
Pass & Seymour/LeGrand	5252-I	5261-I	1591-SHG

2. 15A-250V, NEMA 6-15, straight blade grounding type:

	RECEPTACLE	CAP
Arrow-Hart	5661-I	6666
Bryant	5661-I	5666-N
General Electric	GE4069-2	GED0611
Hubbell	5661-I	5666-C
Pass & Seymour/LeGrand	5662-I	5666-X

3. 15A-125V, NEMA L5-15, locking type with ground:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	4700	4721	4731
Bryant	4700	4721-NSY	4732-NSY
General Electric	GL4700	GLD0511	GLD0513
Hubbell	4700	4720-C	4729-C
Pass & Seymour/LeGrand	4700	L515-P	L515-C

4. 20A-125V, NEMA 5-20, straight blade grounding type:

	RECEPTACLE	CAP
Arrow-Hart	5361-I	5362-I
Bryant	5361-I	5362-I
General Electric	GE4102-2	GE4108-2
Hubbell	5361-I	5362-I
Pass & Seymour/LeGrand	5361-I	5362-I

5. 20A-125V, NEMA L5-20, two-pole, three-wire locking type, with ground:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	6200	6202	6204
Bryant	70520-FR	70520-NP	70520-NC
General Electric	GL0520	GLD0521	GLD0523
Hubbell	2310-A	2311	2313
Pass & Seymour/LeGrand	L520-R	L520-P	L520-C

6. 20A-125V, NEMA 5-20, two-pole, three-wire, straight blade isolated grounding type receptacle:

	DUPLEX	SINGLE
Arrow-Hart	IG5362	IG5361
Bryant	5362-IG	5361-IG
General Electric	GE8300-IG	GE8310-IG
Hubbell	IG-5362	IG-5361
Pass & Seymour/Legrand	IG-6300	IG-5361

7. 20A-125 VAC, two-pole, three-wire, NEMA 5-20, straight blade, specification grade, ivory color, ground fault circuit interrupter receptacle (GFCI), rated for feed-through wiring, with LED indicator light:

	GFCI RECEPTACLE
Hubbell	GF-5362I
Pass & Seymour	2091-S-L-I
Leviton	6898-I

8. 20A-125/250V, NEMA 14-20, three-pole, four-wire straight blade grounding type:

	RECEPTACLE	CAP
Arrow-Hart	5759	5757
Bryant	-	-
General Electric	GE1420	GED1421
Hubbell	8410	8411-C
Pass & Seymour/Legrand	L1420-R	L1420-P

9. 20A-250V, NEMA 6-20, two-pole, three-wire straight blade grounding type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	8510	6866	6869
Bryant	5461	5466N	5469N
General Electric	GE4182	GED0621	GED0623
Hubbell	5461	HBL5466-C	HBL5469-C
Pass & Seymour/Legrand	5871	5466-X	5469-X

10. 20A-120/208V, NEMA L21-20, four-pole, five-wire locking and grounding type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	6470	6472	6474
Bryant	72120-FR	72120-NP	72120-NC
General Electric	GL2120	GLD2121	GLD2123
Hubbell	2510A	2511	2513
Pass & Seymour/Legrand	L2120R	L2120P	L2120C

11. 20A-250V, NEMA L6-20, two-pole, three-wire locking and grounding type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	6210	6212	6214
Bryant	70620FR	70620NP	70620NC
General Electric	GL0620	GLD0621	GLD0623
Hubbell	2320A	2321	2323
Pass & Seymour/LeGrand	L620-R	L620-P	L620-C

12. 20A-480V, NEMA L16-20, three-pole, four-wire locking type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	6430	6432	6434
Bryant	71620-FR	71620-NP	71620-NC
General Electric	GL1620	GLD1621	GLD1623
Hubbell	2430A	2431	2433
Pass & Seymour/LeGrand	L1620-R	L1620-P	L1620-C

13. 30A-125V, NEMA 5-30, two-pole, three-wire straight blade grounding type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	5716N	5717N	6716N
Bryant	9530-FR	9630-RP	-
General Electric	GE4138-3	GED0531	GED0533
Hubbell	9308	9309	-
Pass & Seymour/LeGrand	3802	5921	-

14. 30A-125V, NEMA L5-30, two-pole, three-wire grounding and locking type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	6330	6332	6334
Bryant	70530-FR	70530-NP	70530-NC
General Electric	GL0530	GLD0531	GLD0533
Hubbell	2610	2611	2613
Pass & Seymour/LeGrand	L530-R	L530-P	L530-C

15. 30A-125/250V, NEMA 14-30, three-pole, four-wire straight blade grounding type:

	RECEPTACLE	CAP
Arrow-Hart	5744N	5746N
Bryant	9430-FR	5746
General Electric	GE4191-3	GED1431
Hubbell	9430	9431
Pass & Seymour/LeGrand	5740	5741-AN

16. 30A-125/250V, NEMA L14-30, three-pole, four-wire grounding and locking type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	6510	6512	6514
Bryant	71430-FR	71430-NP	71430-NC
General Electric	GL1430	GLD1431	GLD1433
Hubbell	2710-A	2711	2713
Pass & Seymour/LeGrand	L1430-R	L1430-P	L1430-C

17. 30A-250V, NEMA L6-30, two-pole, three-wire locking blade grounding type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	6340	6342	6344
Bryant	70630-FR	70630-NP	70630-NC
General Electric	GL0630	GLD0631	GLD0633
Hubbell	2620-A	2621	2623
Pass & Seymour/LeGrand	L630-R	L630-P	L630-C

18. 30A-250V, NEMA 6-30, two-pole, three-wire straight blade grounding type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	5700N	5701N	6700N
Bryant	9630-FR	9630-ANP	-
General Electric	GE4139-3	GE4328-9	GE4373-9
Hubbell	9330	9331	-
Pass & Seymour/LeGrand	3801	5931	-

19. 50A-208V (50A-600V), three-pole, four-wire locking type with ground:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	3769	3765	3764
Bryant	3769	3765	3764
General Electric	LD3769	LD3765	LD3764
Hubbell	3769	3765-C	3764-C
Pass & Seymour/LeGrand	3769	3765	3764

20. 50A-125/250V, NEMA 15-50, three-pole, four-wire grounding straight blade type:

	RECEPTACLE	CAP
Arrow-Hart	5754N	5745N
Bryant	9450-FR	5745
General Electric	GE4181-3	GE4180-3
Hubbell	9450	9451
Pass & Seymour/LeGrand	5750	5751-AN

21. 50A-125/250V, three-pole, four-wire grounding locking blade type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	CS6369	CS6365	CS6364
Bryant	CS6369	CS6365	CS6364
General Electric	-	-	-
Hubbell	CS6369	CS6365	CS6364
Pass & Seymour/LeGrand	-	-	-

22. 50A-250V, NEMA 6-50, two-pole, three-wire grounding straight blade type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	5709N	5710N	6709N
Bryant	9650-FR	9650-RP	-
General Electric	GE4141-3	GED0651	GED0653
Hubbell	9367	9368	-
Pass & Seymour/LeGrand	3804	3869	-

23. 60A-120/208V, three-phase, 60 Hz, five-pole, five-wire, watertight, with threaded cap:

	BOX	ANGLE ADAPTER	RECEPTACLE BODY	COMPLETE ASSEMBLY
Hubbell	26401	26404	26520	-
Crouse-Hinds	-	-	-	Area-6575
Russell Stoll	-	-	-	DS6516-FRAB-

24. 60A-480V, NEMA L16-20, three-pole, four-wire locking type:

	RECEPTACLE	CAP	CONNECTOR
Arrow-Hart	-	-	-
Bryant	-	-	-
General Electric	-	-	-
Hubbell	HBL 26410	HBL 26402	HBL 26418
Pass & Seymour/LeGrand	-	-	-

- D. Safety receptacle: 15A-125V, NEMA 5-15, straight blade grounding safety receptacle, Hubbell No. SG-62H-1.
- E. Door monitoring switches:
1. General: Provide magnetic door switches (one per leaf) and key switches at specific door locations as indicated on Drawings. Refer to Electrical Drawings details for schematic installation details of door switches.
 2. Magnetic contact switches: Provide concealed magnetic SPDT switches with minimum 6-ft. wire leads, Sentrol No. 1076W-06 for hollow metal doors and frames. Where necessary, provide other similar Sentrol types to suit concealed installation conditions, as approved by Owner and compatible with Owner's ride control and/or existing security system equipment. Color of switches to closely match finish or paint color of door frame.
 3. Key switches: Arrow-Hart No. 1191L.
- F. Device cover plates:
1. Interior plates: Specification grade plastic, 0.1 in. thick, ivory in color, UL listed.
 - a. Plates in kitchens and restrooms to be polished stainless steel, 0.040 in. thick except in kitchens use double lift lid weatherproof gasketed plates for convenience receptacles.
 - b. MATV plate: RMS No. CA-4028.
 2. Exterior plates: Choose type of exterior cover plate in accord with the device location and/or manner in which device will be used. Device cover plates shall be die-cast aluminum with hinged cover, rated for respective type of use specified below, or as indicated on Drawings.
 - a. Outlet box weatherproof hoods: NEMA 3R rating, gasketed, for unattended use with cover closed, padlockable latching cover to meet OSHA lockout/tagout requirements, large cord opening and UL listed. As manufactured by Hubbell, Intermatic or Leviton.
 - b. Low profile weatherproof cover: Gasketed, approved for use with cover open, self-closing hinged covers (two independent self-closing lids for duplex receptacles which are horizontally mounted), UL listed. As manufactured by Hubbell, Leviton or Pass & Seymour.

- c. Communication outlet weatherproof hoods: NEMA 3R rating for unattended use with cover closed, two-cord openings and UL listed. As manufactured by Red Dot.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Mount switches and receptacles in vertical position in building interiors.
- B. Mount receptacles with weatherproof plates in horizontal position.
- C. Install receptacles mounted vertically so that the ground contact falls on the top position, and horizontally-mounted receptacles with neutral pole in top position.
- D. Use plastic blank plates on J-boxes in public areas.
- E. Use mechanical type door switches for load control.
- F. Install receptacles for plug in lighting fixtures within 36 in. of fixture location.
- G. Use safety type receptacles with low profile weatherproof metal covers for all convenience outlets in guest accessible areas (i.e., queue lines, waiting areas, etc.).
- H. All GFI type exterior receptacles shall be provided with weatherproof metal hoods.
- I. GFI type receptacles shall not be fed-through wire.

END OF SECTION

SECTION 26 0142

NAMEPLATES AND WARNING SIGNS

PART 1 - GENERAL

Not Used.

PART 2 - PRODUCTS

2.01 NAMEPLATES

- A. Nameplate shall be plastic laminate with 3/4" high letters in white on black background screwed onto equipment designations shall clearly state:
1. Equipment Enclosure Nameplates.
 - a. Manufacturer's nameplate including equipment design rating of current, voltage, KVA, HP, bus bracing rating, or as applicable.
 - b. Equipment nameplate designating system usage and purpose, system nominal voltage, equipment rating for KVA, amperes, HP and RPM as applicable. Designation data per drawings or to be supplied with shop drawings approval.
 2. Device nameplates: Device usage, purpose, or circuit number; manufacturer and electrical characteristic ratings including the following:
 - a. Circuit Breakers: Voltage, continuous current, maximum interrupting current and trip current.
 - b. Switches: Voltage, continuous current, horsepower or maximum current switching. If fused, include nameplate stating "Fuses must be replaced with current limiting type of identical characteristics."
 - c. Contactors: Voltage, continuous current, horsepower or interrupting current, and whether "mechanically-held" or "electrically-held".
 - d. Motors: Rated voltage, full load amperes, frequency, phases, speed, horsepower, code letter rating, time rating, type of winding, class and temperature.

10/01/2011

CDC MODULAR CLASSROOM AND SHADE STRUCTURES
VENTURA COLLEGE - VCCCD

NAMEPLATES & WARNING SIGNS

- e. Controllers: Voltage, current, horsepower and trip setting of motor running over current protection.

2.02 WARNING SIGNS

- A. Warning signs shall be minimum 18 gauge steel, white porcelain enamel finish with red lettering. Lettering to read "DANGER - HIGH VOLTAGE" in 1" letters. Warning signs to be included on door or immediately above door of all electrical equipment rooms, vaults or closets containing equipment rooms, vaults or closets containing equipment energized above 150 volts to ground, except where such spaces are accessible from public areas.

2.03 WARNING SIGN DESIGNATION

- A. Warning designation in 1" red letters shall be painted by stencil or pre-printed adhesive on each pull box, cabinet or 1-foot length of exposed conduit stating "DANGER" and giving voltage of enclosed conductors such as "DANGER - 480 VOLTS", for all systems over 150 volts to ground.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Nameplates shall be mounted by self-tapping or threaded screws and bolts or by rivets.
- B. Signs shall be permanently mounted with cadmium plated steel screws or nickel-plated brass bolts.

END OF SECTION

SECTION 26 0164

BRANCH CIRCUIT PANELBOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Branch circuit panelboards.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 260000.
- B. Overcurrent Protective Devices: Section 260180.
- C. Control Devices: Section 264901.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Provide factory assembled, enclosed panelboards in dead front cabinets, with doors, surface mounted or recessed as indicated, not less than 20" wide and 5-3/4" deep. Height will depend on the number of breakers and spaces.
- B. Where a control compartment is indicated, provide an integral compartment with a separate hinged lockable door held with captive screws. Identify all internal control wiring with manufacturers wire numbering or control wire numbering when indicated, at all terminal points and connections.
- C. Provide feeder terminal lugs for both main lugs only and main breakers rated for use with copper conductors.
- D. Provide full length copper bussing including areas indicated as space only.
- E. Provide full size neutral bus where neutral bus is indicated. Provide equipment ground bus and bolt-on circuit breakers.
- F. Key all door locks alike.

- G. 120/208V, 3 Phase, 4 Wire Panelboards: Square-D Co. Type NQOD or Powerlink G3 NF with programmable module where designated, alternate bid for General Electric type AQ.
- H. 277/480V, 3 Phase, 4 Wire Panelboards: Square-D Co. Type NF, alternate bid for General Electric type CCB.
- I. All equipment shall be listed to meet or exceed the available fault current by 10%.
- J. Doors shall be hinged.
- K. All placards are welded steel type.
- L. Provide hinged deadfront doors to allow internal access to panel without totally rewiring cover panel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Secure panelboards to building structure to withstand wire pulling strains.
- B. Secure surface mounted panelboards to wood studs or channel material spanning metal studs.
- C. Do not use toggle bolts.
- D. Contractor shall program lighting control Powerlink panelboard per owner's requirements.

3.02 LABELING AND IDENTIFICATION

- A. Provide engraved plastic nameplates on all branch circuit panelboards shown on the single line diagram.
- B. Provide panelboard and source feed designation on nameplates with 3/8" minimum height lettering for the panel name and 1/4" height lettering for the source feed designation.

EXAMPLE: LA

FED FROM: DLA

- C. Secure nameplates with at least two spaces or rivets. Cementing and adhesive installation not acceptable.

- D. Provide a typewritten directory for each branch circuit panelboard, showing each circuits and its use. Provide metal directory frame with plastic window.

END OF SECTION

SECTION 26 0170

DISCONNECTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Disconnects: Switches, fused or unfused.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 260010.
- B. Fuses: Section 260180.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Square D Company
- B. General Electric

2.02 MATERIAL AND FABRICATION

- A. Provide heavy duty type, quick-make, quick-break disconnects with cover interlocks.
- B. Provide NEMA Type 1 enclosure for dry locations, provide the proper enclosure for other locations as indicated.
- C. Provide motor rated toggle switches where indicated.
- D. Provide fused disconnect for elevator drive motors.
- E. Provide rejection clips on disconnects where rejection type fuses are to be installed.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Securely fasten disconnects to structure to withstand wire pulling strains.

3.02 LABELING AND IDENTIFICATION

- A. Provide engraved plastic nameplates on individually mounted disconnects with minimum 1/4" height letters indicating the load served and the source feed designation.

EXAMPLE: LOAD: A/C-1

FED FROM: DHA-1

- B. Secure nameplates with at least two screws or rivets. Cementing and adhesive installation not acceptable.

END OF SECTION

SECTION 26 0190
SUPPORT DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Support devices for conduit, boxes, lighting fixtures and equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Hangers, Straps and Beam Clamps:
1. Efcor.
 2. Raco, Inc.
 3. Steel City.
 4. O.Z./Gedney Co.
 5. Caddy Fastening System by ERICO Products Inc.
- B. Channels and Fittings:
1. Kindorf.
 2. Unistrut Corp.
- C. Anchors:
1. Acherman-Johnson Corp.
 2. Phillips Drill Co.
 3. Rawl Products Co.

2.02 MATERIAL AND FABRICATION

- A. Hangers: Steel cadmium plated.
- B. Straps: One-hole and two-hole malleable iron, hot-dipped galvanized or steel, cadmium or zinc plated.
- C. Beam Clamps: Malleable iron, hot-dipped galvanized or cadmium plated.
- D. Channels and Fittings:
 - 1. Channels: Hot-dipped galvanized.
 - 2. Fittings: Galvanized.
- E. Anchors: Self drilling and expansion bolt types. No wood or fiber plugs or concrete nails are acceptable.

PART 3 - EXECUTION

3.01 USE

- A. Use one-hole or two-hole straps for single conduit runs on walls or ceilings.
- B. Use hangers with solid steel rods for hanging single conduits.
- C. Use formed channel trapezes for groups of two or more conduits.
- D. To fasten boxes and supports to:
 - 1. Wood: Use wood screws or screw type nails of equal holding power.
 - 2. Brick and Concrete: Use bolts and expansion shields.
 - 3. Hollow Masonry Units: Use toggle bolts.
- E. Support sheet metal boxes from building structure directly or by bar hangers.
- F. Do not penetrate reinforced concrete beams with fastenings more than 1-1/2" or reinforced concrete joints with more than 3/4" fastenings to prevent contact with reinforcing steel.

END OF SECTION

SECTION 26 2450

GROUNDING

PART 1 - GENERAL

1.01 REFERENCES

- A. N.E.C.: Article 250 "Grounding".
- B. Underwriter's Laboratories (U.L.). Standard A67 - "Grounding and Bonding Equipment". STD 869 - Grounding and Bonding.
- C. ITEE - Standards 142 and 241.

1.02 DESCRIPTION OF SYSTEM:

- A. A permanent grounding system with methods and materials in accordance with applicable Codes and Standards, able to conduct ground fault currents to the grounded neutral of electrical distribution systems, and limit potential differences between grounding conductors, raceways and enclosures.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's data on grounding systems and accessories.
- B. Shop Drawings: Submit layout drawings of grounding systems and accessories including, but not limited to, ground wiring, copper braid and bus, ground rods, and plate electrodes.

1.04 QUALITY ASSURANCE:

- A. Installer qualifies with at least 3 years of successful installation experience on projects with electrical grounding experience similar to that required for project.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Handle electrical grounding accessories and components carefully to avoid damage. Store in location that will protect from dirt and weather.

PART 2 - PRODUCTS

2.01 GROUND RODS:

- A. Copper clad steel, unless indicated otherwise. Minimum dimension of 5/8" diameter by 8' long or larger if indicated and sectional rods with couplings where lengths exceeding 12' are specified or indicated, or where added driving depth is required to achieve a specified minimum resistance.
- 2.02 GROUNDING ELECTRODE:
- A. Bare stranded copper, 3/0 AWG unless indicated otherwise, for installation in soil or embedded in concrete and cable with type TW insulation when installed in raceway. Install without splice from connection to connection.
- 2.03 GROUNDING CONDUCTORS:
- A. Type TW insulation, unless specified or indicated otherwise with a continuous green outer insulating jacket for size #6 AWG and smaller and with green tape banding for #4 AWG and larger, marked at each access point (e.g.: Junction boxes, Enclosures).
- 2.04 CLAMPS AND PRESSURE CONNECTORS:
- A. Cast copper, copper alloy, or bronze alloy suitable for use with aluminum and copper. Double bolt type with formed shoe and "U" cable clamp for connection to pipe or conduit; Single bolt type with cable shoe and "U" clamp for connections to flat bar or metal; and double bolt, parallel conductor split clamp type for cable to cable connections.
- 2.05 WELDED CONNECTIONS:
- A. Exothermic process (Cadweld or Thermoweld).
- 2.06 EQUIPMENT ROOM GROUND TERMINAL BAR:
- A. Copper 1/4" X 2-1/2" X 24", unless otherwise indicated. Two rows of holes on 1-1/2" centers for 1/2" bolt, to receive cables from two directions.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Ground conductive raceways, cable trays and enclosures for electrical systems wiring. Make ground circuits complete to form permanent conductive paths. Solidly ground each low voltage electrical system unless indicated or specified as ungrounded, or grounded through an impedance of a specified value. Provide bare conductors when in open air or soil and provide 600 volt, green, insulated conductors when in raceway.

3.02 MAIN GROUNDING JUMPER:

- A. Install a main grounding jumper between the system neutral and the enclosure ground bus (or directly to enclosure where ground bus is not present) at each location where system grounding is required. Main grounding jumper:
 - 1. Formed bus in switchboards and panelboards.
 - 2. Formed bus or copper cable in transformers not coupled in unitized assembly with distribution equipment.

3.03 GROUND CONNECTIONS:

- A. Make grounding electrode connections electrically ahead of any overcurrent or disconnect device or tap connection such that disconnection of neutral load conductors does not interfere with or remove the system ground connection. Use separate lugs on the transformer neutral terminals for neutral and main grounding jumpers when cable is used for transformer connections.

3.04 SEPARATELY DERIVED SYSTEMS:

- A. For each separately derived system, grounded or ungrounded, install a grounding electrode conductor between each system enclosure ground bus (or bolted connection to enclosure where ground bus is not present) and a cold water pipe or building structural steel of one (1) inch size or larger near the separately derived system ground connection. Make connections to water pipes or steel accessible for easy inspection. Provide a separate ground conductor for each audio, video, isolated panels and UPS as noted on the plans.

3.05 SERVICE GROUND:

- A. For each low voltage service, install a grounding electrode conductor between the system enclosure ground bus and the water service entrance to the building and install bonding jumpers around insulating unions and removable fittings in the water pipe between the grounding electrode conductor connection to the water pipe and the water service entrance.

3.06 GROUNDING ELECTRODE SYSTEM:

- A. Install a complete grounding electrode system with interconnecting cables and terminations at the equipment room ground terminal bar. Make connections to the grounding electrode system accessible. Install the following grounding electrode systems:
 - 1. Metal frame of building.

2. Grounding electrode encased by at least two inches of concrete, within and near the bottom of the building foundation or footing of the type specified in Part 2 - Products, at least 20 feet in length without splice from connection to connection.
3. Connection of other metal piping systems as required by National Electrical Code Article 250.
4. Driven ground rods.
5. Driven steel piles.
6. Connection to water service with bonding jumper around water meter.

3.07 GROUNDING ELECTRODE CONDUCTORS:

- A. Install grounding electrode conductor in PVC or other non-conductive, non-metallic enclosure where a raceway system is indicated or necessary for conductor installation. Install grounding electrode conductors without splice from the enclosure ground bus to the connection at the grounding electrode system.

3.08 GROUND RODS:

- A. Install a vertical position, full length below grade unless specified otherwise, and with conductor and top of rod 6" minimum below grade. Provide exothermic welds at all connections.

3.09 EQUIPMENT ROOM GROUND TERMINAL BAR:

- A. Install in equipment rooms where indicated. Mount bar by anchors and bolts using 1-1/2" long segments of 1/2" rigid conduit as spacer between bar and wall. Use a minimum of two supports, 18" on center. Connect grounding electrode system conductors, system enclosure ground bus, and other indicated electrode systems to the terminal bar. Label permanently all ground conductors as to destination location, e.g. TR1, panel IPS, etcetera.

3.10 EQUIPMENT GROUND:

- A. Form the equipment ground circuits with rigid metallic raceways (e.g., EMT, rigid steel conduit) unless indicated otherwise. Make all threaded coupling connections wrench tight. Install bonding jumpers for continuity around fittings and terminations where the conductive raceway is made non-continuous. Where indicated or specified, install ground conductors in raceways to augment the circuits formed by the metallic raceway system. Bond the conductors to boxes or enclosures in which access is possible. Size conductors as specified, indicated, or required by code,

10/01/2011

whichever is larger. Install grounding bushings and bonding jumpers to enclosures or ground bussing for the following: Service entrance feeder; each location where multiple ring knockouts are damaged during conduit installation; each location where conduits are stubbed up into floor mounted and each conduit termination at a painted enclosure where paint is not removed before installation of raceway.

3.11 FLEXIBLE RACEWAY GROUNDING:

- A. Install a ground conductor inside all flexible raceways (e.g., Flexible steel, liquid tight) regardless of length. Bond the conductor to the enclosure or ground bus in the nearest box or access on either side of the flexible section. Size conductor as specified, indicated, or required by code, whichever is larger.

3.12 NON-CONDUCTIVE RACEWAY:

- A. Install a ground conductor in raceways of non-conductive materials. Bond conductor to conductive enclosures in which access is possible. Bond non-current carrying conductive equipment contained in a non-conductive enclosure. Install insulated or bare conductors, sized as specified, indicated, or required by code, whichever is larger.

3.13 SECTIONAL RACEWAY:

- A. Install a ground conductor in sectional raceways with removable covers for access (e.g., Plug-in strips, surface raceway systems, and wireways) unless specified otherwise. Size conductor in accordance with the N.E.C. for the largest phase conductor size installed in raceway, or as indicated. Bond sections of the raceway to the ground conductor. Connect receptacle ground terminals in the raceway to the ground conductor, and make other ground connections indicated on the drawings.

3.14 CABLE SUPPORT SYSTEMS:

- A. Ground elements of the cable support system to panelboards, cabinets and switchboards from which their circuits originate. Install a ground conductor sized as required by code, as indicated, or #12 AWG, whichever is larger.

3.15 MULTI-CONDUCTOR CABLE, METALLIC SHEATH:

- A. Use multi-conductor cable with metallic sheath or armor approved for use as ground circuit conductor or install ground conductor(s). Size ground circuit conductor as required by code, as specified, or as indicated on the drawings, whichever is larger. Terminating devices for cable using the sheath or armor as the ground circuit conductor shall be approved for use as the connecting device between the cable and the enclosure. Terminate internal ground circuit conductors by lug to the interior of

10/01/2011

the enclosure or to the contained ground bus where present. Use bare or clearly identified internal grounding conductors.

3.16 MULTI-CONDUCTOR CABLE, NON-METALLIC SHEATHED:

- A. Use only non-metallic sheathed multi-conductor cables having a ground circuit conductor enclosed in the sheath the same size as the ungrounded conductors. Use bare or clearly identified internal grounding conductors. Terminate ground circuit conductor by lug to the enclosure ground bus where present or to the interior of the enclosure.

3.17 GROUND CONDUCTOR BONDING:

- A. Bond grounding conductors to boxes or enclosures at each access point. Do not use building steel as equipment grounding path. Use welded ground connections, at least where such are buried in soil, installed below slabs on grade, or embedded in concrete.

END OF SECTION

SECTION 26 2510
LIGHTING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Lighting fixtures, including lamps, accessories and support materials.

B. Related work:

1. Submittals: Section 01 3300.

2. Outlet and Junction Boxes: Section 26 0130.

3. Supporting Devices: Section 26 0190.

4. Contactors, Relays, Time Switches, Photocontrols, etc.: Section 26 4901.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

A. Fixtures schedule lists one or more acceptable manufacturers for each fixture type.

B. Provide all lighting fixtures of each type from the same manufacturer.

C. Provide sockets for screw base lamps of plated steel, brass or bronze.

D. Lamps Acceptable Manufacturers:

1. General Electric.

2. Phillips.

3. Sylvania.

4. As indicated for specialty lamps.

- E. Flexible metal conduit systems connecting individual tandem wired lighting fixtures.
 - 1. Conductors carrying line voltage and current shall be sized in accordance with the overcurrent device protecting the circuit indicated.
 - 2. Provide a #12 AWG minimum size ground conductor.
- F. Provide electronic ballasts for all fluorescent and HID fixtures.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide a lighting fixture for each lighting outlet indicated.
- B. Provide recessed and semi recessed fixtures with mounting frames compatible with the ceiling and wall systems employed and secure fixture mechanically to frame.
- C. Align rows of suspended and surface mounted fluorescent fixtures to form straight lines at uniform elevations.
- D. Provide swivel ball type hangers which will allow a minimum of 45 degrees angle for fixtures indicated as pendant mounted.
- E. Make recessed fixture fit snugly against ceiling to prevent light leakage.
- F. Support suspended and surface mounted LED fixtures as follows:
 - 1. Fixtures not over 12 inches wide and not over 50 inches long, a minimum of two fastenings.
 - 2. Fixtures not over 12 inches wide and over 50 inches long, a minimum of three fastenings.
 - 3. Fixtures over 12 inches wide and not over 50 inches long, a minimum of four fastenings.
- G. Support pendant mounted LED fixtures as follows:
 - 1. Single fixtures not over 12 inches wide, a minimum of two single pendants.

2. Single fixtures over 12 inches wide, a minimum of two single pendants at each end or one double pendant at each end.
 3. Continuous rows of fixtures not over 12 inches wide, a minimum of one single pendant for each fixture plus one for each row.
 4. Continuous rows of fixtures over 12 inches wide, a minimum of two single pendants or one double pendant for each fixture plus one for each row.
 5. Locate pendants for continuous row fixtures at each joint and each end of row.
 6. Rigidly fasten continuous row fixtures together with fixtures manufacturer supplied joiner.
- H. Provide each lighting fixture with the lamps indicated on the fixture schedule.
1. Provide self extinguishing lamps in open bottom or unshielded metal halide fixtures.
- I. Clean and relamp existing fixtures to be reused.
- J. EMT shall not be used to support suspended fixtures of any type. Suspension shall be by means of standard hangers, where available and applicable, by rigid threaded conduit and fittings, or by rods.
- K. Where fixtures are to be mounted on, or suspended from concrete ceiling, provide cast in place inserts.
- L. Fixtures shall not be supported by outlet box cover screws alone; provide a fixture stud or “hickey” for added support.
- M. Provide a junction box at each exit light fixture indicated.
- N. Provide weatherproof boxes and connectors and liquid tight flexible conduit to each light fixture.
- O. All suspended fixtures will be installed with 1/8-inch safety cable and four Crosby clamps (two top and two bottom) to be used as a fixture support backup.

END OF SECTION

SECTION 26 4721

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification document provides the requirements for the Fire Alarm Systems throughout the facility. These systems shall include, but not be limited to, system terminal cabinets, signal power boosters, backboards, terminal strips, devices with termination, wire/cabling, testing and verification and other relevant components. The contractor shall include all costs for devices, wire, cable, panels, installation labor, tests, approvals and as-built documentation. Additionally, the contractor will be required to provide the necessary interfaces (control modules, etc.) to the monitoring system in which audio is incorporated. All conduits for the fire alarm systems and associated wiring shall be included. The fire alarm contractor shall provide “shop” drawing layouts to owner showing device locations mounting heights and conduit size requirements.

1.02 WORK INCLUDED

- A. General Requirements:
 - 1. The contractor shall furnish and install a modified addressable fire alarm system comprising of fire alarm panels, signal booster panels, Manual Pull Stations, Smoke Detectors, Heat Detectors, system alarm connections, connection to building water flow, tamper and post indicator valves, Alarm Horns, Alarm Strobes, Alarm Horn/Strobes, Alarm Mini-Horns as required by code and as specified herein.
 - 2. Labeling: All system equipment shall be labeled with the manufacturer's name and logotype to assure the integrity of the complete system.

1.03 RELATED WORK DOCUMENTS

- A. Submittals.
- B. Coordination
- C. Electrical General Requirements
- D. Electrical Raceway

- E. Electrical Conduit
- F. Electrical Outlet and Junction Boxes
- G. Electrical Interior Pull boxes and wireways
- H. Electrical Grounding systems
- I. Fire Alarm Audio Evacuation Systems
- J. Mechanical Plans (connections to heating and air conditioning units)
- K. Plumbing Plans (sprinkler flow, tamper and Post Indicator Valve locations)
- L. Systems Plans (monitoring systems)
- M. Electrical Plans

1.04 DESCRIPTION:

- A. This section of the specification includes the furnishing, installation, and connection of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel, auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.
- B. The fire alarm system shall comply with requirements of NFPA Standards for protected premises signaling systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
- C. The FACP and peripheral initiation devices shall be manufactured 100% by a single manufacturer (or division thereof).
- D. The installing company shall employ only factory-trained technicians on site to install and perform the final checkout and to ensure the systems integrity. No “parts & smarts” installation will be acceptable.

1.05 SCOPE

- A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on a two wire Signaling Line Circuit (SLC).
2. Initiation Device Circuits (IDC) shall be a two-wire circuit.
3. Notification Appliance Circuits (NAC) shall be a two-wire circuit.
4. Digitized electronic signals shall employ check digits or multiple polling.
5. A single ground or open on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
6. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.
7. The Alarm System shall perform the following functions:
 - a. Provide automatic fire alarm detection in all building spaces as dictated by local code requirements.
 - b. Provide evacuation signals for employees and guests as dictated by local code requirements.
 - c. Connect all buildings local fire alarm panels into a seamless network incorporating a central control console located in the administration building and remote console in the guard gatehouse.
 - d. Interface with local show control, audio systems, ride control to perform the required activation or shutdown as dictated by local code requirements.
 - e. Perform any added functions as specified or required by local codes or AHJ.

C. Basic System Functional Operation:

1. When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
 - a. The system alarm LED shall flash.

- b. A local piezo electric signal in the control panel shall sound.
- c. A backlit 80 character LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
- d. Printing and history storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence.
- e. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed and the associated system outputs (alarm Notification appliances and/or relays) shall be activated.

1.06 SUBMITTALS

A. General:

- 1. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
- 2. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Software Modifications:

- 1. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
- 2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modification on site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

- C. Certifications: Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.
- D. Owner's designated representative shall approve all equipment submittals.
- E. In addition to the General requirements, submit all materials for approval arranged in the same order as Specifications, Individually referenced to Specification paragraph and drawing number Submit number required In Division I plus three (3) copies of A4 material and 2 prints plus one reproducible of drawings in A0, minimum. Submit A4 items bound in volumes and A0 drawings in edgebound sets.
- F. Progress Schedule: Include duration and milestones for the following:
 - 1. All submittals specified.
 - 2. Shipment to site.
 - 3. Installation.
 - 4. Field testing.
 - 5. Training.
 - 6. First beneficial use date.
- G. Manufacturer's Product Data:
 - 1. List of Materials: For each item, Include:
 - a. Manufacturer.
 - b. Model number.
 - c. Listing: CSFM.
 - d. Quantity.
 - 2. Manufacturer's Product Data: In sequence of List of Materials, Data sheet for each item, including all accessories, marked for proposed product.

Photo copies will not be accepted. Original manufacturer specifications sheets only.

H. Field/Shop Drawings:

1. Resubmit: for coordination reference complete with corrections from previous submittal:
 - a. List of Materials.
 - b. Manufacturer's Product Data.
2. Field (installation) Drawings: Collate in sequence:
 - a. Drawing Index/symbol sheet.
 - b. Floor plans. At scale of Contract Documents. Show:
 - (1) Devices with circuit number.
 - (2) Rough-in.
 - (3) Mounting height.
 - (4) Conduit size.
 - (5) Wire type.
 - (6) Wire fill.
 - c. Sections/Elevations. At scale of Contract Documents.
 - (1) Mounting location reference.
 - d. Enlarged Plans. At scale of Contract Documents or larger as required for trade coordination. Show:
 - (1) Refer to "floor plans".
 - (2) Architectural features.
 - (3) Clearances.
 - e. System conduit riser drawing, show:

- (1) Terminal cabinets.
 - (2) Coordination with floor plans.
 - (3) Wire runs not shown on floor plans.
 - (4) Wire type.
 - (5) Wire fill.
- f. Mounting details
- (1) Stamped and signed by Engineer licensed in jurisdiction for work of this type.
 - (2) Show loads, strength of connections, etc.
 - (3) Show calculations - on drawings or in bound volume for review by authorities having jurisdiction.
 - (4) Provide details for:
 - (a) Racks/cabinets/panels
- g. Installation details as required.
- (1) Terminal cabinets: terminations.
- h. Wire run sheets (if used) Show:
- (1) Wire Number.
 - (2) Source.
 - (3) Designation
 - (4) Signal Type.
 - (5) Wire type.
 - (6) Operating level or voltage (if applies).
3. Shop (Fabrication) Drawings: Collate In sequence:
- a. Drawing Index/symbol sheet (if separate set from Field Drawings).

- b. System functional drawings. Submit separate drawing for each system/subsystem. Show:
 - (1) Equipment: Function, make, model.
 - (2) Wire number.
 - (3) Wire Type.

 - c. Fabrication details submit for:
 - (1) Receptacles.
 - (2) Panels.
 - (3) Special mounting provisions.
 - (4) Legends/engraving details. Half or full size:
 - (a) Receptacles.
 - (b) Panels.
 - (c) Equipment.
- 4. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 5. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
 - 6. Show annunciator layout, configurations, and terminations.

I. Shop and Field Test Reports:

- 1. Schedule: Submit test reports In timely manner relative to Project schedule such that owner may conduct Verification of submitted Test Data at owner's option, without delay of progress.
 - a. Shop test report: Submit prior to shipping completed system to project site.

- b. Field test report: Submit following system completion and prior to and as condition precedent to owner's acceptance of the Work of this Section.
 2. Test Reports: Include:
 - a. Time and date of test.
 - b. Personnel conducting test.
 - c. Test Object.
 - d. Procedure used.
 - e. Test equipment, Including serial and date of calibration.
 - f. Results of test - numerical or graphical presentation.
 3. Verification of Submitted Test Data: owner may elect to verify some or all test data submitted. Retest In presence of designated observer(s) at reasonable convenience of owner. Provide technician familiar with work of this Section. Provide all test equipment.
- J. Reference Data for Operation, Maintenance and Repair
 1. In addition to the requirements of Division 1, submit one (1) additional set. Submit in three post binders (not ring binder) with Tabs.
 2. Index.
 3. Systems operating Instructions.
 4. Reduced set of system Record Drawings.
 5. Key schedule.
 6. Maintenance and spare parts schedules.
 7. Shop and Field Test Reports.
 8. Equipment manuals. Collate alphabetically by manufacturer. Provide manufacturer's original operation, Instruction and service manuals for each equipment item. For each set, provide manufacturer's original printed copies only. Photocopies not acceptable.

- K. Record Drawings in AutoCAD R2014 format min.
1. Quantity:
 - a. Review sets: as for Shop and Field Drawings.
 - b. Record set:
 - (1) Three (3) blue-line.
 - (2) One CD disk with applicable .DWG files
 2. Content: All drawings required under “Field and Shop Drawings”. Show “as Installed” condition.
- L. Other than Specified Equipment
1. Equipment other than specified shall be considered for approval provided the following is submitted in writing by the contractor to the Consultant ten (3) days before the bid date:
 2. Complete lists, descriptions and drawings of materials to be used.
 3. A complete list of current drain requirements during normal supervisory conditions, trouble conditions, and alarm conditions
 4. Battery standby calculations showing total standby power needed to meet the system requirements as specified
- M. Substituted Equipment:
1. If equipment other than that specified is supplied, it shall be the contractor's obligation to submit the appropriate documentation and allow the specifying Consultant sufficient time to consider the equality of the substituted items.
- N. Satisfying the Entire Intent of these Specifications
1. It is the contractor's responsibility to meet the entire intent of these specifications. Deviations from the specified items shall be at the risk of the contractor until the date of final acceptance by the Consultant and owner's representative.

2. All costs for removal, relocation, or replacement of a substituted item shall be at the risk of the contractor.

1.07 GUARANTEE/WARRANTY

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.08 POST CONTRACT MAINTENANCE:

- A. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.
- B. As part of the submittal, include a quote for a maintenance contract to provide all maintenance, test, and repair described below. Include also a quote of unscheduled maintenance/repair, including hourly rates for technicians trained on this equipment, and response travel costs. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.
- C. Maintenance and testing shall be on a semiannual basis or as required by the AHJ. A preventive maintenance schedule shall be provided by the contractor that shall describe the protocol for preventive maintenance. The schedule shall include:
 1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, waterflow switches and all accessories of the fire alarm system.
 2. Each circuit in the fire alarm system shall be tested semiannually.
 3. Each smoke detector shall be tested in accordance with the requirements of CSFM & NFPA Standards.

1.09 POST CONTRACT EXPANSIONS:

- A. The contractor shall provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.
- B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of intelligent or

addressable devices by ten percent (10%). This quotation shall include intelligent smoke detectors, intelligent heat detectors, addressable manual stations, addressable monitor modules and addressable control modules equal (list actual quantity of each type).

- C. Quotation shall include installation and test labor and labor to reprogram the system for this 10% expansion. If additional FACP hardware would be required, include the material and labor necessary to install this hardware.
- D. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the FACP and at each intelligent addressable device. Do not include cost of conventional peripherals or the cost of initiating devices or Notification appliances connected to the addressable monitor/control modules.
- E. Submittals that do not include this estimate of post contract expansion cost will not be accepted.

1.10 APPLICABLE STANDARDS AND SPECIFICATIONS:

- A. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards.
 - 1. DSA Requirements
 - 2. County of Ventura Fire Code
 - 3. All requirements of the Authority Having Jurisdiction (AHJ).

1.11 APPROVALS

- A. The system shall have proper listing and/or approval from internationally recognized agencies.
- B. The system shall be listed by the international agencies as suitable for extinguishing release applications.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL

- A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed

by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the Fire Alarm Code.

- B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- C. All Equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.02 CONDUIT AND WIRE

A. Conduit:

1. Conduit shall be red & installed in accordance with the DSA & fire marshal requirements.
2. All wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of Power, or Class circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors.
4. Wiring for 24 volt control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduits shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

B. Wire:

1. All fire alarm system wiring shall be new.

2. Wiring shall be in accordance with DSA codes and approved by CSFM and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
 3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
 4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation.
 5. Wiring used for the multiplex communication loop shall be twisted and shielded and support a minimum wiring distance of 10,000 feet. The system shall support up to 1,000 ft. of untwisted, unshielded wire. The system shall permit use of IDC and NAC wiring in the same conduit with the communication loop.
 6. All field wiring shall be completely supervised.
 7. The Fire Alarm Control panel shall be capable of T-Tapping two wire type. Signaling Line Circuits (SLC's) Systems, which do not allow or have restrictions in, for example, the amount of T-Taps, length of T-Taps etc., are not acceptable.
 8. All wire/cable used in underground or below grade, applications shall be rated by the manufacturer for the intended use and be gel filled.
- C. Terminal Boxes, Junction Boxes and Cabinets:
1. All boxes and cabinets shall be DIN listed for their use and purpose.
- D. Initiating circuits shall be arranged to serve like categories (manual, smoke, water flow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.
- E. The Fire Alarm Control Panel shall be connected to a separate dedicated branch circuit, maximum 16 amperes. This circuit shall be labeled at the Main Power Distribution Panel as FIRE ALARM. Fire Alarm Control Panel Primary Power wiring shall be 12 AWG. The Control Panel Cabinet shall be grounded securely to either a cold water pipe or grounding rod.

2.03 MAIN FIRE ALARM CONTROL PANEL

- A. The FACP shall be a FCI and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent detectors, addressable modules, printer, annunciators, and other system controlled devices.
- B. System Capacity and General Operation:
 - 1. The control panel shall provide, or be capable of expansion to 2000 intelligent/addressable devices.
 - 2. The system shall include Form-C alarm and trouble relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include four Class B (Style Y) programmable Notification Appliance Circuits.
 - 3. The system shall support programmable driven relays.
 - 4. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display, individual, color coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.
 - 5. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.
 - 6. The FACP shall provide the following features:
 - a. Drift Compensation to extend detector accuracy over life.
 - b. Sensitivity Test
 - c. Maintenance Alert to warn of excessive smoke detector dirt or dust accumulation.
 - d. System Status Reports to display or printer.
 - e. Alarm Verification, with verification counters.
 - f. PAS presignal.
 - g. Rapid manual station reporting (under 2 seconds).
 - h. Non-Alarm points for general (non-fire) control.

- i. Periodic Detector Test, conducted automatically by software.
- j. Pre-alarm for advanced fire warning.
- k. Cross Zoning with the capability of: counting two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
- l. March time and temporal coding options.
- m. Walk Test, with check for two detectors set to same address.
- n. Security Monitor Points.
- o. Control-By-Time for non-fire operations, with holiday schedules.
- p. Day/Night automatic adjustment of detector sensitivity.
- q. Device Blink Control for sleeping areas.

C. Central Microprocessor:

- 1. The Microprocessor shall communicate with, monitor, and control all external interfaces with the control panel. It shall include EPROM for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
- 2. The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory and shall not be lost even if system primary and secondary power failure occurs.
- 3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.

D. Display:

1. The display shall provide all the controls and indicators used by the system operator and may be used to program all system operational parameters.
2. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, and software zones.
3. The display shall provide an 80-character back-lit alphanumeric Liquid Crystal Display (LCD). It shall also provide Light-Emitting-Diodes (LEDs), that will indicate the status of the following system parameters: AC POWER, SYSTEM ALARM, SYSTEM TROUBLE, SIGNAL SILENCED, SUPERVISORY, and PRE-ALARM.
4. The Display shall provide a key touch key-pad with control capability to command all system functions, entry of alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
5. The Display shall include the following operator functions: SIGNAL SILENCE, RESET, DRILL, and ACKNOWLEDGE.

E. Signaling Line Circuit (SLC):

1. The SLC interface shall provide power to and communicate with intelligent detectors (Ionization, Photoelectric, or Thermal) and intelligent modules (monitor or control). This shall be accomplished over a single SLC loop and shall be capable of Style 4 or Style 6 wiring.
2. The loop interface shall receive analog information from all intelligent detectors that shall be processed to determine whether normal, alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
3. The detector software shall meet all local VDE and VdS requirements and be certified by VdS as a calibrated sensitivity test instrument.
4. The detector software shall allow manual or automatic sensitivity adjustment.

F. Serial Interfaces:

1. An EIA-232 interface between the Fire Alarm Control Panel and Listed Electronic Data Processing (EDP) peripherals shall be provided.
2. The EIA-232 interface shall allow the use of printers, CRT monitors, and PC compatible computers.
3. The EIA-232 interface shall include special protocol methods that allow off-site monitoring of the FACP over standard dial-up phone lines. This ancillary capability shall allow remote readout of all status information, including analog values, and shall not interfere with or degrade FACP operations when used. It shall allow remote FACP Acknowledge, Reset, or Signal Silence in this mode. It shall also allow adjustment of detector sensitivity and readout of the history file.
4. An EIA-485 interface shall be available for the serial connection of remote annunciators and LCD displays.
5. The EIA-485 interface may be used for network connection to a Proprietary Receiving Unit.

G. Enclosures:

1. The control panel shall be housed in a DIN listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.

H. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients, consistent with DIN standards.

I. An optional module shall be available which provides Form-C relays rated at 5.0. The relays shall track programmable software zones.

J. Power Supply:

1. The Power Supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.

2. It shall provide 5.0 amps of usable Notification appliance power, using a switching 24 VDC regulator. A 3.0 amp notification expansion power supply shall be available for the demanding requirements visual devices, for a total system capacity of 8 amps.
 3. It shall provide a battery charger for 30 hours of standby using dual-rate charging techniques for fast battery recharge.
 4. It shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.
 5. It shall be power-limited.
 6. It shall provide optional meters to indicate battery voltage and charging current.
- K. Field Charging Power Supply: The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.
1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 30 hour standby.
 2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.
 3. The FCPS shall include an attractive surface mount backbox.
 4. The Field Charging Power Supply shall include the ability to delay the AC fail delay requirements.
 5. The FCPS include power limited circuitry.
- L. Field Wiring Terminal Blocks:
1. For ease of service all panel I/O wiring terminal blocks shall be a removable, plug-in type and have sufficient capacity for 18 to 12 AWG wire. Terminal blocks, which are permanently fixed, are not acceptable.
- M. Operators Controls:
1. Acknowledge Switch:

- a. Activation of the control panel Acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and Trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next alarm or trouble condition.
 - b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
 - 2. Signal Silence Switch: Activation of the Signal silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
 - 3. System Reset Switch: The system reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
 - a. Holding the system RESET switch shall perform a lamp test function.
 - 4. Drill (Evacuate) Switch:
 - a. The drill switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.
- N. Field Programming:
- 1. The system shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.
 - 2. All programming may be accomplished through the standard FACP keypad.
 - 3. All field defined programs shall be stored in non-volatile memory.
 - 4. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two levels of password protection shall be provided in addition to a key-lock cabinet.

One level is used for status level changes such as zone disable or manual on/off commands. A second (higher-level) is used for actual change of program information.

5. Program edit shall not interfere with normal operation and fire protection. If a fire condition is detected during programming operation, the system shall exit programming and perform fire protection functions as programmed.
6. A special program check function shall be provided to detect common operator errors.
7. An Auto-Program (self-learn) function shall be provided to quickly install initial functions and make the system operational.
8. For flexibility, an off-line programming function, with batch upload/download, shall also be available.

O. Specific System Operations:

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all analog intelligent smoke detectors in the system from the control panel. Sensitivity range shall be within the allowed window.
2. Alarm Verification: Each intelligent addressable smoke detector in the system shall be independently selected and enabled to be alarm verified. The alarm verification delay shall be programmable from 5 to 30 seconds. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.
3. Point Disable: Any device in the system may be enabled or disabled through the system keypad.
4. Point Read: The system shall be able to display or print the following point status diagnostic functions:
 - a. Device status.
 - b. Device types.
 - c. Custom device labels.

- d. View analog detector values.
 - e. Device zone assignments.
 - f. Il program Parameters.
5. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing system status.
6. System History Recording and Reporting: The Fire Alarm Control Panel shall contain a History Buffer that will be capable of storing up to 800 system alarms/troubles/operator actions. Each of these activation's will be stored and time and date stamped with the actual time of the activation. The contents of the History Buffer may be manually reviewed, one event at a time, or printed in its entirety.
- a. Although the foreground history buffer may be cleared for user convenience, a background, non-erasable buffer shall be maintained which provides the last 800 system events.
 - b. The History Buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable.
7. Automatic Detector Maintenance Alert: The Fire Alarm Control Panel shall automatically interrogate each intelligent smoke detector and shall analyze the detector responses over a period of time.
- a. If any intelligent smoke detector in the system responds with a reading that is below or above normal limits, then the system will enter the Trouble Mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. Pre-alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.

9. Software Zones: The FACP shall provide 99 software zones. All addressable devices may be field programmed to be grouped into software zones for control activation and annunciation purposes.

2.04 SYSTEM COMPONENTS

A. Signaling Devices:

1. STROBES (as required by Code):
 - a. Strobes shall be provided as required and indicated on the contract drawings and shall have a flash rate not to exceed 60 times per minute.
 - b. The word "Fire" shall appear on the lens or lens plate.
 - c. Strobes shall be a 15cd, 1Hz minimum for restrooms and 75cd, 1Hz for large rooms (i.e., library, multi-use, meeting, etc.).
 - d. Strobes shall mount to 2 gang box, flush or surface as shown on drawings.
2. HORNS (as required by Code):
 - a. Alarm Horns shall be provided as required and as indicated on the contract drawings.
 - b. Horns shall mount to a 4 sq. box. for interior use and a cast weatherproof, gasketed box for exterior use.
 - c. Horns shall be red in color.
 - d. Sound pressure level shall be 85dBA at 10 feet
 - e. Screw terminals shall be provided for field connections.
 - f. Unit may be configured with optional Strobe for interior Horn/Strobe applications.
3. HORN/STROBES (as required by Code):
 - a. Horn/Strobe combination units shall be supplied as required and as indicated on the contract drawings.
 - b. Strobes shall not to exceed 60 flashes per minute.

- c. The word “Fire” shall appear on the lens or lens plate.
 - d. Strobes shall be a 15cd, 1Hz minimum restrooms and 75cd, 1Hz for large rooms (i.e., library, multi-use)
 - e. Wiring for Strobes shall be separate from Horn Circuits. Strobes shall mount to face of Horn unit.
 - f. Wiring for Horns shall be separate from Strobe Circuits. Horns shall mount to a 4 sq. box. for interior use.
 - g. Horns shall be red in color.
 - h. Sound pressure level shall be 85dBA at 10 feet
 - i. Screw terminals shall be provided for field connections.
4. MINI-HORNS (as required by Code):
- a. Mini-Horn units shall be supplied as required and as indicated on the contract drawings.
 - b. Horns shall mount to a single gang or double gang box for interior use.
 - c. Mini-Horns shall be red in color.
 - d. Sound pressure level shall be 90dBA at 10 feet
 - e. Screw terminals shall be provided for field connections.

B. Addressable Devices – General:

- 1. Addressable Devices shall provide an address-setting means using rotary decimal switches.
- 2. Addressable Devices shall use simple to install and maintain decade (numbered 1 to 10) type address switches. Devices, which use a binary address setting method, such as a dip switch, are not an allowable substitute.
- 3. Detectors shall be intelligent and addressable, and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuits.

4. Addressable smoke and thermal detectors shall provide dual alarm and power LEDs. Both LEDs shall flash under normal conditions indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the flashing mode operation of the detector LEDs shall be optional through the system field program. An output connection shall also be provided in the base to connect an external remote alarm LED.
5. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.
6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by DIN, VDE and/or VdS as meeting the calibrated sensitivity test requirements.
7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. An optional base shall be available with a built-in (local) sounder rated at 85 DBA minimum.
8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

C. Addressable Pull Box (manual station as required by Code):

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.

D. Intelligent Photoelectric Smoke Detector:

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

E. Intelligent Thermal Detectors:

1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

F. Intelligent Duct Smoke Detector:

1. The in-duct smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

G. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLC loops.
2. The monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box.
3. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch x 1-1/4 inch x 1/2 inch. This version need not include Style D or an LED.

H. Two Wire Detector Monitor Module:

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2. The two-wire monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box or with an optional surface backbox.
3. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

I. Addressable Control Module:

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.
2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
4. Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised listed remote power supply.
5. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

J. Waterflow Indicators:

1. Flow switches shall be integral, mechanical, non-coded, non-accumulative retard type.
2. Flow switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30 Å 45 seconds.
3. Flow switches shall be located a minimum of one (1) foot from a fitting that changes the direction of the flow and a minimum of three (3) feet from a valve.

K. Sprinkler and Standpipe Valve Supervisory Switches:

1. Each sprinkler system water supply control valve riser or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. Each Post Indicator Valve (PIV) or main gate valve shall be equipped with a supervisory switch.
3. Mount switch so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
4. The mechanism shall be contained in a weatherproof aluminum housing that shall provide a 3/4 inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. Switch housing to be finished in red baked enamel.
6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

L. LCD Alphanumeric Display Annunciator:

1. The alphanumeric display annunciator shall be a supervised, back-lit LCD display containing a minimum of forty (40) characters for alarm annunciation in clear English text.

2. The LCD annunciator shall display all alarm and trouble conditions in the system.
3. Up to 32 LCD annunciators may be connected to an EIA 485 interface. LCD annunciators shall not reduce the annunciation or point capacity of the system. Each LCD shall include vital system wide functions such as, System Acknowledge, Silence and Reset.
4. LCD display annunciators shall mimic the main control panel 80 character display and shall not require special programming.
5. The LCD annunciator shall have switches that may be programmed for System control such as, Global Acknowledge, Global Signal Silence and Global System Reset. These switch inputs shall be capable of being disabled permanently or by a key lockout function on the front plate.

2.05 BATTERIES:

- A. Shall be 12 volt, Gell-Cell type (two required).
- B. Battery shall have sufficient capacity to power the fire alarm system for not less than thirty hours (30) plus thirty minutes (30) of alarm upon a normal AC power failure.
- C. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with the VDE, DIN, EN, VdS Standards, along with local codes, as shown on the drawings, and as recommended by the equipment manufacturer.
- B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

- C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

PART 4 - GUARANTEE AND TEST

4.01 GENERAL

- A. The contractor shall guarantee all equipment and wiring free from inherent mechanical and electrical defects for one year from the date of final acceptance by consultant.
- B. Acceptance shall consist of the following:
 - 1. Burn-in period.
 - a. The system shall be accepted for start of warranty upon successful completion and testing of AHJ and Consultant.
 - b. Burn-In period shall be a 30 day time frame to allow the system to operate free of defects, grounds, programming faults, etc.
 - c. The 30 day Burn-In shall begin the day of acceptance by AHJ.
 - d. The Burn-In period shall be 30 days of continuous use without system trouble, false alarm, open, short or ground condition present.
 - e. Should the system fail for any reason during the burn-in period, the contractor shall respond immediately upon notification by owner's personnel and correct said deficiencies.
 - f. Upon correction and restoration, the "Burn-In" period shall be reset to "0" and the 30 day count shall begin again.
 - g. Start of Warranty shall commence upon day 31 of successful "Burn-In" period.

4.02 FINAL TEST (as applicable for project devices)

- A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically

supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with VDE, VdS and DIN Standards.

1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
 2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
 3. Verify activation of all flow switches.
 4. Open initiating device circuits and verify that the trouble signal actuates.
 5. Open and short signaling line circuits and verify that the trouble signal actuates.
 6. Open and short Notification Appliance Circuits and verify that trouble signal actuates.
 7. Ground all circuits and verify response of trouble signals.
 8. Check presence and audibility of tone at all alarm notification devices.
 9. Check installation, supervision, and operation of all intelligent smoke detectors using the Walk Test.
 10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
 11. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
- B. Before the installation shall be considered completed and acceptable by the awarding authority, a test on the system shall be performed as follows:
1. The contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the owner, the inspector of record (IOR) and the fire department shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel.

2. Audibility tests shall be performed utilizing a calibrated Decibel Meter. The system shall be capable of supplying 15dB over ambient noise levels. Tests shall be conducted in the presence of the Consultant and AHJ at selected locations by Consultant/AHJ. Prior to acceptance, testing the contractor shall have verified signal levels in each area as to meeting the above criteria.
3. Where application of heat would destroy any detector, it may be manually activated.
4. The initiation circuits and the indicating appliance circuits shall be opened in at least two (2) locations per zone to check for the presence of correct supervisory circuitry.
5. When the testing has been completed to the satisfaction of both the contractor's job foreman and the representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.
6. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance and successful burn in period.
7. Prior to final test, the fire department must be notified in accordance with local requirements.
8. Submit completed Certification form. The form shall be submitted in type written format. Hand written forms will not be accepted.

4.03 AS-BUILT DRAWINGS, TESTING, AND MAINTENANCE INSTRUCTIONS

- A. A complete set of reproducible "as-built" drawings in AutoCAD R2015 format (CDs and sheets) showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system acceptance.
- B. Operating and Instruction Manuals:

1. Operating and instruction manuals shall be submitted prior to testing of the system. Four (4) complete sets of operating and instruction manuals shall be delivered to the owner upon completion.
2. The owner shall be furnished with all programming disks for each installation as well as hard copy printouts. Provide necessary training and/or schooling to designated owner personnel at no additional cost to owner. Training shall be at the owner's designated location, by factory trained personnel. Provide all necessary interconnection cables for remote programming via "laptop" computer.

C. Testing Frequency Instructions:

1. Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, methods for testing each individual piece of equipment, and a complete trouble-shooting manual explaining how to test the primary internal parts of each piece of equipment shall be delivered to the owner upon completion of the system.

D. Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:

1. Instruction on replacing any components of the system, including internal parts.
2. Instructions on periodic cleaning and adjustment of equipment with a schedule of these functions
3. A complete list of all equipment and components with information as to the address and phone number of both the manufacturer and local supplier of each item.
4. User operating instructions, shall be provided prominently displayed on a separate sheet located next to the control unit.
5. Administrative staff of the school shall be thoroughly instructed in the use of system by authorized distributor. Such service shall be provided in conjunction with the Fire Alarm equipment.
6. Staff of the Park as well as owner maintenance staff shall be thoroughly instructed in the use of the System. Training shall include a minimum of three (1) hour sessions, to be scheduled at the Owner's designated time.

7. Maintenance instruction shall be performed in the same manner as described above. Training shall include a minimum of three (1) hour sessions, to be scheduled at the owner's designated time.

END OF SECTION

SECTION 27 5127

PUBLIC ADDRESS ASSISTIVE LISTENING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Principal items of Work in this Section include but are not limited to:
1. Portable use - Assistive listening systems in Classrooms.
 2. Conductors, transmitters, receivers, and terminal strips to provide for functions and requirements.
 3. Provide labor, engineering, testing, materials, components, and supervision to provide a complete operable installation. Includes training of personnel on site.
- B. Related Requirements:
1. Division 01 - General Requirements.
 2. Section 26 0050 - Basic Electrical Materials and Methods.
 3. Section 26 0111 - Conduits
 4. Section 26 0130 – Electrical Boxes.
 5. Section 26 0120 - Conductors
 6. Section 26 2450 - Grounding.
- C. Acronyms:
- DTMF Dual Tone Multiple Frequency
- IC Intercom
- LCD Liquid Crystal Display
- OAR Owner Authorized Representative
- PA Public Address
- PABX Private Auxiliary Branch Exchange

1.02 PROJECT REQUIREMENTS

- A. Reproduction of speech shall be clear, high fidelity, with frequencies within range of system faithfully reproduced with no detectable noise, hum, or distortion.
- B. Reproduction shall be attained at sound levels sufficient to override noise levels typical for schools, to provide a satisfactory and serviceable system.
- C. Engineering documentation including:
 - 1. Floor plans indicating locations of devices, conduit runs, wire types, and terminal cabinets.
 - 2. Block diagrams indicating items and their point-to-point connections in a manner following floor plan layout.

1.03 SUBMITTALS

- A. Provide the following submittals:
 - 1. Catalog cuts, technical data, and descriptive literature on components. Data shall be clearly marked and noted to identify specific ranges, model numbers, sizes, and other pertinent data.
 - 2. Submittals shall be bound and shall contain an index organized vertically by assembly and item number and horizontally by columns.
 - a. The first assembly shall be the major head end equipment.
 - b. The leftmost column shall be the item number; next shall be the description, followed by the applicable specification section number, and followed by the specified item, which is followed by the submitted item.
 - c. The rightmost column shall be for notes, which shall be used to reference the reason for submitting items other than as specified.
 - 3. Submittals shall contain product data sheets or catalog cut sheets for each item listed in the Index. These shall be arranged in the same order as the index and if more than one item is shown, the submitted items shall be highlighted or marked with an arrow.
 - a. The product data shall be sufficiently detailed to allow the Architect to evaluate the suitability of the product and to allow other trades to provide necessary coordination.
 - 4. Provide Shop Drawings, in the same size as the Record Drawings. Shop Drawings shall be prepared in latest version of AutoCAD with three CD-ROM electronic copies submitted along with full sized Shop Drawings.

- a. Provide a complete set of scaled drawings of transmitters, receivers, and cabinets with designations, dimensions, color, operating controls, instrument wiring, and schematic diagrams of circuits, following Drawings as baseline.
 - b. Shop Drawings shall provide details as to interfaces of equipment of other Work, identifying numbers of wires, termination requirements, voltages, point to point connection details and other pertinent details. Include front elevations, cabinet dimensions, types of mounting, doors, barriers, catalog number of locks, and finishes for terminal cabinets.
 - c. Include a dimensional Shop Drawing of console nameplate. Nameplate shall contain school name, firm, address, telephone number for warrantee and maintenance, and power load.
 - d. For Signal Terminal Cabinets Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutters, type of mounting, finish, and catalog number of locks. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.
 - e. Shop drawings shall indicate equipment locations, wiring and schematics, details, panel configurations, sizes and a point-to-point wiring diagram of circuits. Shop drawings shall indicate interfaces to equipment furnished by others, identifying numbers of wires, termination requirements, and other pertinent details. Responsibility for each end of interfaces shall be noted on shop drawings.
 - f. Submit Structural Related Drawings prepared, signed, and sealed by a structural engineer licensed in the State of California. Details shall be provided indicating the proposed means of support and attachment of wall and floor mounted racks. Calculations shall be based on the maximum load rating of the cabinet by the manufacturer in a CBC regulated Seismic environment, not the weight at time of occupancy.
5. Contractor shall have completed at least five projects of equal scope to systems described herein and shall have been in the business of supplying and installing specified type of systems for at least five years.
 6. Include in the Material List Submission copies of the manufacturers' certifications that the Contractor is an authorized distributor and service provider of the submitted manufacturers' products and Contractor's staff has been adequately trained and certified in the installation of those products.

7. Provide a letter from the Manufacturer guarantying the availability of spare parts common to proposed system for a period no less than five years on components
8. Calculations: Power load of assistive listening system shall be calculated by the Installer on a separate sheet and shall be included in submittal.
9. System shall be portable and easily set up in classrooms. System shall be easily stored and transported to the classroom. All interconnecting cabling and equipment shall be “plug and play” and not required technical assistance or experience. Supplier shall note on his submittal the power requirements for this equipment and the size of the storage facility necessary to provide a home for this equipment when not being utilized.

1.04 CODES AND STANDARDS

- A. Complete installation shall meet or exceed the latest edition of the following standards:
 1. EIA/TIA-568: Commercial building telecommunications wiring standard.
 2. EIA/TIA-569: Commercial building standard for telecommunications pathways and spaces.
 3. EIA/TIA-606: Administration standard for telecommunications infrastructure of commercial buildings.
 4. EIA/TIA-607: Commercial building grounding and bonding requirements for telecommunications.
 5. CCR Part 2 - California Building Code (CBC).
 6. CCR Part 3 - California Electrical Code (CEC).
 7. ANSI, ASTM, UL, NEMA, IEEE and FCC standards as applicable.
 8. BICSI Telecommunications Distribution Methods Manual, current edition.

1.05 SYSTEM DESCRIPTION

- A. PA assistive listening system shall be located where shown on Drawings. System amplifier shall operate in conjunction with an associated audio input/output/switching panel as described. Amplifier cabinet shall be steel, vented, and furnished with a hinged lockable door.

1.06 QUALITY ASSURANCE

- A. Work shall conform to CCR, Title 24 Part 3, Basic Electrical Regulation and National Electrical Code, latest edition.
- B. Only a Contractor holding licenses required by legally constituted authorities having jurisdiction over the work, shall do the work.
- C. Persons skilled in trade represented by work, and in accordance with applicable building best trade practice.
- D. Work shall be performed by a Contractor that has completed at least five school systems of equal scope to system described herein and shall have been engaged in business of supplying and installing specified type of systems for at least five years. Contractor shall maintain a fully equipped service organization capable of furnishing repair service to equipment
- E. Use adequate numbers of CTS Certified skilled technicians who are manufacturer certified, trained and experienced on the necessary crafts and familiar with the specified requirements and methods needed for the proper performance of the work.
- F. Coordinate cable runs, and rack equipment locations with the OAR prior to the start of the cable installation. Contractor and OAR must agree as to the final location of devices and the cable plant design.
- G. Provide manpower and tools required to participate in Owners Quality Assurance Testing.
- H. Design analysis shall be performed by certified individuals under the direct observation of the sound engineer responsible for preparation of the Shop Drawings.
- I. System startup and electro-acoustical testing with the Techron TEF20 instrumentation shall be performed under the direct observation of the sound engineer responsible for preparation of the Shop Drawings.

1.07 WARRANTY

- A. Warranty that work executed and materials furnished shall be free from defects in materials and workmanship for a minimum period of three years from date of installation acceptance, excluding specific items of work that require a warranty of a greater period as set forth in this Specification. In the event a manufacturer's warranty is longer than three years, the manufacturer's warranty shall be the warranty period. Immediately upon receipt of written notice from the Owner, repair or replace at no expense to the Owner, any defective material or work that may be discovered before final acceptance of work or within warranty period; any material or work damaged thereby; and adjacent material or work that may be displaced in repair or replacement. Examination of or failure to examine work by the Owner shall not relieve Contractor from these obligations.

PART 2 - PRODUCTS

2.01

2.01 KEYS AND LOCKS

- A. Provide keys and locks for cabinets and equipment; locks shall be keyed to a Corbin No. 60 key, for access to operate equipment and Corbin No. 90 key, for access to service equipment.

2.02 SYSTEM COMPONENTS:

- A. Assistive Listening System: FM hearing assistance system shall be as manufactured by Listen Technologies Corp, and shall be furnished with the following components, including various permanent or portable systems and devices, to comply with the, current School District Policy and to match the Assistive Listening Systems used throughout the entire district.

1. Base Station: The base station shall operate in 72MHz - 76 MHz bands and shall be furnished with remote-mounted antenna to cover a minimum of 1,000 feet. Determine the best location for the antenna for optimum reception within the room, before installation.
2. Single-Channel Receiver: No. LR-4200-072, for use by the listener with standard-style headset connections, with headphones. Receiver shall be capable of being clipped to a pocket or belt. Units shall be furnished with Lithium-ion rechargeable batteries be furnished and transmitted to the OAR before Substantial Completion. The quantity of receivers shall be four percent of occupant load of area as indicated on the drawings, but not less than two.
3. Battery Charger Organizer: unit shall be capable of storing or recharging up to 12 receivers at one time. The charger shall be capable of recharging the Lithium-ion batteries without removing the batteries from the receiver. Battery chargers shall be provided in a quantity sufficient to charge all receivers provided in this contract simultaneously

2.03 PORTABLE EQUIPMENT

- A. Furnish a total of six (6) portable RF Receivers, two (2) for each modular (based on the Code required 4 percent maximum of the total of 50 seats).
- B. Portable equipment shall remain in individual boxes and shall be transmitted to the OWNER, for delivery to the School Administrative Office, before Substantial Completion.

PART 3 - EXECUTION

3.01 INSTALLATION

CDC MODULAR CLASSROOM AND SHADE STRUCTURES
VENTURA COLLEGE - VCCCD

10/01/2011
PUBLIC ADDRESS
ASSISTIVE LISTENING SYSTEMS
27 5127- 6

- A. Console and Cabinet Rack Equipment Installation: Equipment within consoles and cabinet racks shall be logically arranged for accessibility and convenient maintenance. Equipment shall be installed on shelves or panels and shall be securely attached.
- B. Amplifiers, power supplies, and other heavy devices shall be installed in the lowest available rack spaces on steel shelves furnished by manufacturer of console and cabinet racks. Cabinet, console, and panel faces including drawers shall be the same color.
- C. Wiring within console and cabinets shall be installed to conform to standard engineering practice, and shall be terminated on terminal strips having a terminal for each required external connection. Wiring shall be cabled, laced, and securely fastened in place so no weight is imposed on any equipment, control switches, or terminals. Wires transmitting audio power shall be shielded. Input and output circuits and terminal strips shall be installed to provide separation necessary for proper operation. Wires shall be identified by number and chart.
- D. Conductor shields for each system shall be grounded at one location only. Grounding shall be installed within console and cabinet racks. There shall be no metallic connection between systems. Conduits for system and 120 volt AC system shall be bonded together at console and cabinet racks.
- E. Terminate 120 volt AC supply conductors directly on specified disconnect switches and in required raceway.

3.02 RELATED SYSTEMS INSTALLATION - GROUNDING

- A. Wiring enclosures, terminal cabinets, outlets, frames of cabinet racks, and other enclosures shall be grounded as required by the California Electrical Code, as specified or required.
- B. Chassis of amplifiers, power supplies, and accessories shall be grounded by bonding to the control cabinet.
- C. Housing, grips of microphone, conductive housings, and other equipment shall be grounded by means of grounding wire or shield in cord or cable furnished for equipment connections.
- D. Circuits shall be grounded as recommended by manufacturer of equipment to which they are connected unless otherwise specified or required.

3.03 OWNERS QUALITY ASSURANCE CERTIFICATION AND TESTING

- A. Provide instruments for testing and demonstrate in presence of the Owner, the circuits and wiring test free of shorts and grounds.
- B. Provide labor, instruments, appliances, equipment, temporary power, and materials necessary to demonstrate to the Owner the installation performs as required.

- C. The Owner reserves the right to perform independent tests of equipment furnished, to determine whether or not equipment complies with requirements specified, and to proceed on basis of results obtained.
- D. The system shall be fully tested and operational before final inspection. Test results shall be provided to the Owner before final inspection.
- E. System startup and testing shall be performed under the direct observation of the sound engineer responsible for preparation of the Shop Drawings.
- F. Reproduction of speech shall be clear, high fidelity and with frequencies within range of system reproduced without detectable noise, hum and distortion.
 - 1. With 0 dB sine wave test signal applied at a line input of the wall mount modular mixer amplifier, adjust level controls so that the amplifier delivers 100 watts RMS or greater into an eight ohm resistive load. Record measurements at 80Hz, 125Hz, 200Hz, 1KHz, 3.15KHz, and 10KHz for each amplifier.
 - 2. With setup and gain adjusted as described above, short the balanced line input with a 620 ohm resistor; 20KHz band limited noise at any cluster amp channel output shall be 76 dB below the level required to produce 100 watts RMS. Record the measured noise level for each line input to a given high-frequency cluster amp output.
 - 3. With setup and gain adjusted as described above and with a 500Hz test signal, measure the total harmonic generation and noise (TH&G) through the audio chain. THG&N shall be not more than 0.5 percent. Record the THG&N for each line input.
 - 4. With 500Hz, 1mV sine wave signal applied to a microphone input of the mixer, amplifier with the gain adjusted so that it delivers 100 watts RMS into an eight-ohm resistive load. Record the THG&N for each microphone input. THG&N shall be 0.5 percent or less.
 - 5. With setup as described above, short the input with a 120 ohm resistor and measure the 20KHz band limited noise at the output. 20 KHz band-limited noise shall be 76 dB below the level required to deliver 100 watts RMS into an eight ohm resistive load. Record the noise level for each microphone input to the given high-frequency cluster amplifier channel output.

3.04 PROJECT RECORD DOCUMENTS

- A. As-Built Documentation
 - 1. Provide three copies Size E (30-inch by 42-inch) of Project site and building plans, indicating location of equipment, conduit, cable routing, ground vaults terminal cabinets, pull boxes and other installation information.
 - 2. Provide two copies of the record Drawings in .DWG format prepared using the

most recent version of AutoCAD on a labeled CD-ROM for use on a Windows platform.

- a. **User** as a key tool in controlling visibility of drawing elements and to provide consistent information between drawings, yet provide control over what is seen on each sheet. Public Address wiring shall be shown on a separate layer, labeled as “Public Address” that uses both building floor plans and conduit supporting structure layers below. The use of any version control blocks or company logos shall be on a layer separate from the premise wiring as-built drawings.
3. Floor plans indicating devices, terminal cabinets and cross connect locations, conduit runs, ground vaults, wire types, cable routing of cables, both underground and in each building with conduit fill and count, and as-built coding used on each cable.
 - a. Drawings shall include block diagrams indicating items and their point-to-point connections in a manner following floor and site plan layout. Drawings shall also include as-built single line diagram, cable site plot plan and floor plans indicating cables, both underground and in each building with conduit, and as-built coding used on each cable
 - b. Floor plans shall indicate devices, terminal cabinets and cross connect locations, conduit runs, ground vaults, wire types, cable routing of cables, both underground and in each building with conduit fill and count, and as-built coding used on each cable

B. Operating and Servicing Manuals, Record Drawings:

1. Deliver three copies of operating and servicing manual. Each complete manual shall be bound in three ring binders and data shall be typewritten or drafted.
 - a. Manuals shall include a page with Project site and Project name, date of Substantial Completion, Contractor name, address, telephone, and fax numbers.
 - b. Manuals shall contain a letter, signed by an officer of the company indicating the beginning and ending date of any warranties described in subsection 1.07 of this specification and shall describe the companies’ commitment to service the warranty during the terms specified.
 - c. Manuals shall include instructions necessary for proper operation and servicing of system and shall include:
 - 1) A single line diagram of the system indicating items and their point-to-point connections in a manner following floor and site plan layout.

- 2) A complete two wire diagram of connections made between components inside the system console.
 - 3) A wiring destination schedule for each circuit leaving console and each rack.
 - 4) Custom fabricated circuits, components and connections not detailed in the manufacturer's manuals shall have wiring diagrams detailing to component level, the manner in which the circuits are connected.
 - 5) A schematic diagram of each amplifier, other components and replacement part numbers.
- d. Manuals shall also include as-built single line diagram, cable site plot plan and floor plans indicating cables, both underground and in each building with conduit, and as-built coding used on each cable. Drawings Size A (8 ½ by 11) and size B (11 by 17) shall be bound into the manual. Larger drawings shall be folded and inserted into transparent envelopes bound into the manual. Programming forms of each system shall be submitted with complete information.

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.

3.07 OWNER ORIENTATION

- A. Before Substantial Completion, provide a four (4) hour Owner instruction period to designated Owner personnel. This training may be combined with instruction provided for the public address system.
- B. Instruction shall be based on manufacturers written operating instructions covering those features of interest to the Owner and applicable to the Work.
- C. After Substantial Completion, and before contract completion, provide two additional one hour "refresher" instruction sessions at times agreed upon by the Owner.

(END OF SECTION)

SECTION 31 10 00

SITE CLEARING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section requires the selective removal and subsequent off-site disposal of the following:
 - 1. Removal and disposal of all abandoned pipe and conduit except for pipe or conduit indicated specifically on plans for abandonment in place.
 - 2. Removal and offsite disposal of grass and root mat.
 - 3. Demolition of asphalt concrete and pavements as indicated on the drawings to straight, neatly saw cut surface.
 - 4. All other removals which may or may not be shown on plans as required for the project construction.

1.02 SITE CONDITIONS

- A. Protections: Contractor shall provide temporary barricades and other forms of protection to protect general public from injury due to demolition work.
- B. Traffic: Conduct demolition operations and debris removal to ensure minimum interference with roads, streets, walks, bike paths, and other adjacent occupied or used facilities. Access must be coordinated with District's Representative.
- C. Utility Services: Maintain all existing utilities to remain in service and protect them against damage during demolition operations.
- D. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations and County Air Pollution Control District pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as flooding and pollution.

1.03 REFERENCES

- A. Standard Specifications for Public Works Construction (Green Book), latest edition.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.01 DEMOLITION

- A. General: Perform demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with governing regulations.
- B. Provide services for effective air and water pollution controls as required by County Air Pollution Control District regulations.
- C. Prior to commencing grading operations, soil containing debris, organics, pavement, or other unsuitable materials, shall be stripped from the foundation and pavement areas. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, tree roots, and soil disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material shall be replaced with compacted fill.
- D. Concrete sidewalks will be removed to the nearest construction or expansion joint to the limits of removal as shown on the plans. Exact locations will be determined in the field by the District's Representative.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from Project site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose of off site.
- B. If hazardous materials are encountered during demolition operations, contact District's Representative.
- C. Burning of removed materials is not permitted on project site.

3.03 HAZARDOUS MATERIALS

- A. Except as otherwise specified, in the event Contractor encounters on the Project site material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or other hazardous materials which have not been rendered harmless, Contractor shall immediately stop Work in the area affected and report the condition to the District's Representative in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Contractor if in fact the material is asbestos, PCB, or other hazardous materials and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos, PCB, or other hazardous materials, or when such materials have been rendered harmless.
- B. Construction involving asbestos cement (transite) pipe shall be performed by qualified personnel in accordance with the standards and specifications set forth by American Water Works Association (AWWA), the Occupational Safety and Health Act (OSHA) and the Environmental Protection Agency (EPA), as well as location jurisdictional codes.

311000

3.04 CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment and demolished materials from site.
 - 1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to existing condition prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by demolition work.

END OF SECTION

SECTION 31 20 00

EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes: Excavation, Compaction and Fill.

1.02 REFERENCE

- A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.

- 1. Standard Specifications for Public Works Construction (SSPWC), latest edition.
- 2. CAL/OSHA Construction Safety Order Requirements.

- B. Soil Testing Service

- 1. The District will engage a soil testing service to include testing soil materials proposed for use in the Work and for quality control testing during grading operations.
- 2. Samples of materials shall be furnished to the testing service by the Contractor at least one week before their anticipated use.
- 3. Work for this Section includes smoothing out areas for density tests and otherwise facilitate testing work, as directed.

1.04 PROJECT CONDITIONS

- A. The Contractor shall visit the site and familiarize himself with existing site conditions.

- B. Additional test borings and other exploratory operations may be made by the Contractor at no cost or liability to the District.

- C. Existing Utilities:

- 1. Where uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult District 's Representative immediately for directions.

Cooperate with the District's Representative in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the District's Representative at no cost to the District. Disturbed trench sections shall be replaced in kind.

2. Contractor to coordinate with the City of Ventura to obtain all required permits and schedule inspections.
- D. Protection of Subgrade: Do not allow equipment to pump, rut, or disturb subgrade, stripped areas, or other areas prepared for Project.
- E. Contractor shall implement measures to prevent soil erosion, and where possible, sediment shall be retained onsite.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.01 SITE PREPARATION

- A. General:
 1. Remove vegetation, improvements, or obstructions interfering with installation of new construction. Transport and legally dispose of off-site. Contractor shall utilize the best construction method to minimize the erosive effect from the removal of site vegetation.
 2. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Paint cuts over one inch in size with tree pruning compound. Care shall be taken so as not to scar any area of the tree's bark.
 3. In order to protect from sediment transfer or contamination from urban run-off during construction, the following grading and erosion control practices shall be followed:
 - a. If grading occurs during the rainy season (November through April), sediment traps, barriers, covers or other methods shall be used to reduce erosion and sedimentation.
 - b. Excavated materials shall not be deposited or stored where the material can be washed away by high water or storm run-off.

- c. Grading operations on site shall be conducted so as to prevent damaging effects of sediment production and dust on the site and on adjoining properties.
- d. When vegetation has to be removed on site, the methods shall be one that minimizes the erosive effects from the removal.
- e. Exposure of soil to erosion by removing vegetation shall be limited to the area required for construction operations. The construction area shall be fenced to define the project.
- f. Temporary mulching, seeding, or other suitable stabilization shall be used to protect areas during construction or other land disturbance activities on site.
- g. Topsoil, removed from the surface in preparation for grading and construction activities on Campus is to be stored on or near the site and protected from erosion while grading operations are underway, provided that such storage may not be located where it would cause suffocation of root systems of trees to be preserved. After completion of such grading, topsoil is to be restored to exposed cut and fill embankments of building pads so as to provide a suitable base of seeding and planting.
- h. Sediment basins, sediment traps, or similar control measures shall be installed before extensive clearing and grading operations begin for site development.
- i. Water or dust palliatives shall be applied to exposed earth services as necessary to control dust emissions.
- j. Revegetation or stabilization of exposed earth surfaces shall take place as soon as possible.

B. Removals

- 1. Clear the site of trees, shrubs, and other vegetation, which is indicated to be removed.
- 2. Completely remove stumps, roots, and other debris to avoid problems with future utilities.
- 3. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
- 4. Existing fills, soil containing debris, organics, pavement, or other unsuitable materials shall be excavated and removed prior to commencing grading

operations. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, landscaping, and soils disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material shall be replaced with compacted fill.

5. The limits and depths for removal of existing fill materials shall be evaluated by project soils engineer during grading.
6. Revegetation or stabilization of exposed earth surface shall take place as soon as possible.

C. Removal of Improvements

1. Remove above-grade and below-grade improvements necessary to permit construction and other work as indicated.
2. Remove from site and legally dispose of off-site, existing fill materials, soil debris, or other unsuitable materials prior to commencing grading operations.

3.02 EXCAVATION

- A. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown, within a tolerance of plus or minus 0.04 foot.
- B. Excavation for Planting Areas: Conform to cross-sections, elevations and dimensions shown, within a tolerance of plus or minus 0.10 foot.

3.03 COMPACTION

- A. General: Fill materials to be compacted to at least 95 percent relative compaction, based on the maximum dry density from ASTM D1557.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the percentages of maximum dry density specified in accordance with ASTM D1557-91 method of compaction.
- C. Moisture Control:
 1. When moisture content of exposed scarified soil and/or fill material is below that sufficient to achieve recommended compaction, water shall be added to the soil and/or fill. While water is being added, soil shall be bladed and mixed to provide relatively uniform moisture content throughout the material.
 2. When moisture content of exposed scarified soil and/or fill material is excessive, material shall be aerated by blading or other methods. Fill placed in pavement

areas shall be compacted at near optimum moisture content. Jetting is not permitted for compaction.

3.04 FILL

- A. In all excavations, use satisfactory excavated or borrow material sampled and tested by the District 's Testing Laboratory.
- B. Fill excavations as promptly as Work permits, but not until completion of the following:
 1. Acceptance by District's Representative of construction below finish grade including, where applicable, waterproofing, damp-proofing, and drainage pipe.
 2. Examination, testing, approval and recording locations of underground utilities.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing and backfilling of voids with satisfactory materials.
 5. Removal of trash and debris.
 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
 7. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- C. Continual dust control, as required by the District, and in accordance with County Air Pollution Control District's Standards shall be required for the project construction.

3.05 GRADING

- A. General: To provide support for building floor slabs, all existing fill and unsuitable natural soils shall be excavated and replaced as properly compacted fill.
- B. Compaction: After grading, compact subgrade surfaces to the depth and percentage of compaction for each area classification.
- C. Fill placement and grading operations shall be performed only under the observation of the District 's Testing Laboratory.
- D. The exterior grades around building areas shall be sloped to drain away from the buildings to prevent ponding of water adjacent to foundations.

- E. Grading operation shall be conducted so as to prevent damaging effects of sediment product and dust on the site and adjoining properties.

3.06 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Transport excess excavated material and legally dispose of off site.

3.07 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: District 's Testing Laboratory will observe, test and approve subgrades and fill layers before further construction Work can be performed. The District's Representative will determine the frequency of tests. Subgrade: Allow at least one field density test of subgrade to be made for every 2000 sq. ft. of paved area, but in no case less than 3 tests.
- B. Field examination and testing will be performed by the District 's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District's Representative advance notice of grading scheduling.
- C. Frequency of Tests for Trenching: As determined by the District's Representative.
- D. If in the opinion of the District's Representative, based on observations, subgrades or fills which have been placed are below specified density, provide corrective work as specified at no additional expense to the District, and pay for retesting of the soil.

3.08 PROTECTION

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work as specified, with retesting, prior to further construction.

END OF SECTION

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.01 SUMMARY

- A. Excavating trenches for construction of utilities.
- B. Trench backfill materials.
- C. Backfilling and compacting requirements.

1.02 REFERENCES

- A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

1.03 SUBMITTALS

- A. Materials source.
- B. Sand equivalent test reports per ASTM D2419.
- C. Certificates.
- D. Drawings for shoring, bracing, sloping, or other provisions for worker protection for any excavation shall conform to the requirements of the CAL/OSHA Construction Safety Orders Requirements.

1.04 EXISTING UTILITIES

- A. Drawings show existing major underground utilities from reference drawings. Prior to excavation, the Contractor shall notify the District's Representative to obtain any additional information which may be applicable to the Work.
- B. Any incident of a utility being inadvertently damaged by the Contractor shall be immediately shutoff and then be immediately repaired by the Contractor at no cost to the District.
- C. Contractor to pothole all utility connections and verify exact size, location and material prior to beginning construction and notify engineer of any discrepancies.

PART 2 - MATERIALS

2.01 APPROVALS

- A. Imported material shall be approved by the District's Representative prior to being brought to the site. Provide a sample of the material in sufficient quantity for the District's Representative's use in evaluating the material.

2.02 TRENCH BACKFILL MATERIAL

- A. Sand bedding shall have a sand equivalent (SE) of 30 or greater. The SE shall be evaluated during grading. Materials shall conform to section 306-1.2.1 of the standard specifications for public works construction and meet local governing agency requirements, whichever are more stringent.
- B. Slurry Backfill shall be a two-sack slurry mix and shall conform to the requirements of Section 201 of the SSPWC for Backfill Slurry.
- C. Aggregate base course shall be per Plan.
- D. Topsoil removed from trenches shall be stockpiled at locations approved by the District's Representative.

2.03 SOURCE QUALITY CONTROL

- A. Inspection and testing shall be performed by the District's Representative.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.

3.02 TRENCH EXCAVATION

- A. All saw cutting shall be neat, straight cuts and shall conform to Section 300-1.3.2 of the SSPWC. All cuts shall be square unless otherwise specifically noted on plans.
- B. Trench excavation shall conform to Section 306-1.1 of the SSPWC and the following requirements:
 1. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavations shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustments to line and grade shall be made by scraping away or filling in with sand under the body of the pipe and not by wedging or blocking.
 2. If the trench is excavated below the required grade, correct any part of the trench excavated below the grade, at no additional cost to the District. Place the backfill material over the full width of trench in compacted layers not exceeding 6 inches deep to the established grade with allowance for the pipe base. If shoring is required, the trenches shall be shored and braced in accordance with the Trench Construction Safety Orders of the Division of Industrial Safety.
 3. When subgrade is encountered that in the opinion of the District's Representative is unsuitable for pipe support, the District's Representative may order the excavation to be carried to an approved depth below the bottom of the pipe and backfilled with sand, to the lines and grades shown on the drawings and specified by the District's Representative.
 4. The minimum width of the trench at the top of the pipe zone shall be as necessary

to install the pipe. The utility lines shall be centered in the trench. In the event of (1) actual physical interference between existing crossing subsurface utilities and the proposed utility lines and (2) vertical discrepancy in connecting proposed utility lines to existing utility system, a minimum clearance of 0.5 feet between the utility line and the crossing, interfering utility shall be provided, unless otherwise indicated on the plans.

5. Where existing utilities or tree roots are to be protected, trench excavation shall be by hand. No mechanical excavating equipment shall be used within 6 inches of any utility or root.
6. Trenching machinery may be used for excavations provided the specified trench width can be maintained.

3.03 TRENCH BACKFILL

- A. Pipe bedding and trench backfill materials: Suitable imported pipe bedding for utilities shall consist of material having a sand equivalent of at least 30. The sand backfill material shall be placed within the pipe zone that extends from the bottom of the pipe to at least 12 inches above the top of the pipe for the full width of the trench. The horizontal distance between the springline of the pipe and the side walls of the trench shall be such that bedding material can be properly placed and compacted below the haunches of the pipe. Pipe bedding and pipe zone backfill shall be compacted to at least 95 percent relative compaction. Backfill material placement shall conform to provisions of Sections 306-1.2.1 and 306-1.3 of the SSPWC.
- B. Trench backfill placed above the pipe zone shall consist of suitable onsite or imported soil. The trench backfill materials shall be compacted to at least 90 percent relative compaction. Compaction shall be increased to a minimum of 95 percent of maximum dry density within structural fills within building areas. Mechanical compaction of trench backfill shall be performed and water consolidation (jetting) methods of compaction shall not be permitted. Trench backfill in landscape areas shall be compacted to a minimum of 90 percent relative compaction or per landscape specifications.
- C. Trench Backfilling shall conform to the requirements of Sections 306-1.2.1 and 306-1.3 of the SSPWC:
 1. During the process of laying pipe in trenches, sufficient material shall be carefully placed and hand tamped about the pipe to hold it firmly to established line and grade. Oversized material, broken rock or shale, if encountered, shall not be used for backfill.
 2. No motor driven mechanical compacting equipment shall be used over pipelines until the backfill has been compacted to 12 inches over the crown of the pipe.
 3. All backfill material shall be deposited in horizontal layers not exceeding the thickness specified in Section 306-1.3.2 of the SSPWC and not exceeding 8 inches in thickness. The distribution of materials shall be such that all material following compaction and consolidation will form a homogeneous mass free of voids, pockets, streaks or other imperfections. Backfilling shall be done with earth free from lumps, hardpan, chunks, paving material, organic matter or other

deleterious substances.

4. Jetting of bedding or backfill material to obtain specific moisture content or for compaction shall not be permitted. If encountered, existing fill in the utility excavation shall be excavated and recompactd or removed and replaced with new fill materials per requirements of Section 2.02.
5. Compaction of all backfill material for trenches, pavements or structures, shall be per provisions of Sections 306-1.2.1 and 306-1.3 of the SSPWC. Appropriate warning detector tape shall be placed over all utilities.
6. Prior to final cleanup or resurfacing, the District's Representative shall take compaction tests in any backfill area and at any depth, with the Contractor providing equipment and operator to assist in such test. If any such compaction test fails, the Contractor shall correct such failure and pay for any retesting that is required. The District's Representative shall make as many tests as he feels is required to receive a satisfactory and acceptable job.

3.04 STOCKPILING

- A. Stockpiling of imported materials or excavated materials shall direct surface water away from approved stockpile site to prevent erosion.
- B. After stockpiles are removed, leave area in a clean and neat condition.

3.05 FIELD QUALITY CONTROL

- A. Inspection and testing shall be performed by District's Representative.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 - GENERAL

1.01 SUMMARY

- A. Aggregate base course for curbs, gutters, sidewalks, and asphalt concrete paving.

1.02 RELATED SECTIONS

- A. Section 31 20 00 Earthwork.
- B. Section 32 12 16 Asphalt Concrete Paving.
- C. Section 32 16 00 Curbs, Gutters, Sidewalks, and Driveways.

1.03 REFERENCES

- A. Standard Specifications for Public Works (SSPWC), latest edition.
- B. ASTM Standards.
- C. State Standard Specifications (SSS), Caltrans, latest edition.

1.04 SUBMITTALS:

- A. Submit material samples and reports in accordance with requirements of District.
- B. Submit samples in sufficient quantities for material testing.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aggregate Base Material shall be Class 2 Aggregate Base conforming to SSS Section 26-1.02A. Aggregate Base shall have a minimum sand equivalence of 22 and a minimum R-value of 78 and shall be free of organic materials and other deleterious substances.
- B. Aggregate Base materials used within building areas shall be free of asphaltic materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify substrate has been inspected; gradients and elevations are correct, and dry.

3.02 AGGREGATE BASE PLACEMENT

- A. Aggregate base placement shall conform to the provisions of the SSPWC, Section 301-2
- B. Level and contour surfaces to elevations and gradients indicated.
- C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- D. Where the required aggregate base thickness is 6 inches or less, the watered base may be spread and compacted in one layer. Where the required thickness is more than 6 inches, the aggregate base material shall be spread and compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.
- E. Aggregate base course shall be dense and unyielding upon proof-rolling with full water truck.

3.03 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch.
- B. Scheduled Compacted Thickness shall conform to the provisions of the SSPWC Section 301-2.2.

3.04 FIELD QUALITY CONTROL

- A. Inspection and testing shall be performed by the District's Testing Laboratory. Compaction testing will be performed in accordance with ASTM D1557, latest edition.
- B. If tests indicate work does not meet specified requirements, remove work, replace and retest at Contractor's expense.

END OF SECTION

SECTION 32 12 16

ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Asphalt concrete paving for parking lots and driveway pavements.

1.02 RELATED SECTIONS

- A. Section 31 20 00 Earthwork.
- B. Section 32 11 23 Aggregate Base Course.

1.03 REFERENCES

- A. Standard Specifications for Public Works Construction (SSPWC), latest edition.
- B. ASTM Standards.

1.04 SUBMITTALS

- A. Submit asphalt concrete mix design(s) for approval of the District Representative.

1.05 TESTING AND INSPECTION

- A. Testing and inspection of asphalt pavement mix(es) and testing of placed stabilizing base course and asphalt pavement will be performed by the District's Testing Laboratory. Testing and inspection will be performed so as to minimize disruption of work.
- B. Allow the District's Testing Laboratory access to the mixing plant for verification of weights or proportions, character of materials used and determination of temperatures used in the preparation of asphaltic concrete mix.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide the aggregate base, and bituminous surface conforming to the requirements of the Standard Specifications for Public Works Construction (SSPWC).

2.02 PAVING MATERIALS

- A. Asphalt Concrete: Asphalt concrete material shall be B-PG 64-10 per SSPWC Section 203-6. The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements.
- B. Asphalt Emulsion: SSPWC Section 203-3, Grade SS-1h.
- C. Prime Coat: Grade SC-70 per SSPWC Section 203-2.
- D. Aggregates for base course shall conform to requirements of Specification Section 32 11 23, Aggregate Base Course.

2.03 ASPHALT PAVEMENT MIX

- A. Combine mineral constituents in proportions to produce a mixture conforming to requirements of the SSPWC Section 203-6.
- B. Percentage by weight of asphalt cement in mixture shall be in accordance with SSPWC Section 203-6.
- C. Maintain thorough and uniform mixture.
- D. Bring asphalt and mineral constituents to required temperatures before mixing. Ensure aggregates are sufficiently dry so as not to cause foaming in mixture.

PART 3 – EXECUTION

3.01 GENERAL

- A. Execute Work in accordance with SSPWC Section 302.

3.02 PREPARATION

- A. Ensure grading of subgrade to required elevation. Subgrade preparation shall be per SSPWC Section 301.
- B. Before final rolling, shape entire section, add additional sub-soil if necessary, and compact subgrade to provide grades, elevation and cross-section indicated. Points of finished subgrade surface shall be within 0.04 foot of elevations indicated on the Drawings.

3.03 BASE COURSE

- A. Place aggregate base in accordance with requirements of Specification Section 32 11 23 and SSPWC Section 301 and to the thickness shown on the Drawings. Grade and compact in 6-inch layers to at least 95 percent of compaction (ASTM D1557).

3.04 MAINTENANCE

- A. Maintain the base course until the asphaltic pavement is in place. Maintenance shall include drainage, rolling, shaping and water as necessary to maintain the course in proper condition. Maintain sufficient moisture at the surface to prevent a dusty condition. Areas of completed base course that are damaged shall be conditioned, reshaped and re-compacted in accordance with the requirements of the Specifications without additional cost to the District.

3.05 TACK COAT

- A. Prior to the application of the asphalt concrete, a paint binder (tack coat) shall be applied to all surfaces of walkway, curbs, gutters, manholes and drainage structures which will be in contact with asphalt pavement per SSPWC Section 302-5.4.
- B. Coat surfaces of catch basins which are to remain free of asphalt with oil, or provide equivalent protection, to prevent asphalt adhesion.

3.06 PRIME COAT

- A. Prior to the application of the asphalt concrete, a prime coat shall be applied at a rate of 0.20 to 0.40 gallons per square yard.

3.07 ASPHALT CONCRETE

- A. Requirements: The bituminous concrete shall consist of mineral aggregate, uniformly mixed with bituminous material in a central plant in accordance with SSPWC Section 203-6. The percentage of asphalt binder shall be in accordance with SSPWC Section 203-6. The mixing plant and construction equipment shall conform to the requirements of SSPWC Sections 302-5 and 400-4.
- B. Placing: Deliver bituminous mixtures to the work site temperatures specified in SSPWC Section 302-5.5. Spread and place in accordance with SSPC Section 302-5.5. Asphalt surface shall be fog-sealed.
- C. Compaction: Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be in accordance with SSPWC Section 302-5.6. Compaction by vehicular traffic shall not be permitted.

3.08 JOINING PAVEMENT

- A. Carefully make joints between old and new pavements or between successive days work in such manner as to insure a continuous bond between old and new sections of the course in accordance with SSPWC Section 302.
- B. Expose and clean edges of existing pavement. Cut edge to straight, vertical surfaces. Paint all joints with a uniform coat of tack coat before the fresh mixture is placed. Prepare joints in the new pavement in accordance with SSPWC Section 302-5.7.

3.09 JOINING NON-PAVED AREAS

- A. Where paving will join landscape or other non-hardscape area a redwood header shall be installed.

3.10 TOLERANCES

- A. Flatness: Maximum variation of 1/8 inch when measured with a 10-foot straight edge.
- B. Variation from True Elevation: Within 1/4 inch.

3.11 FIELD QUALITY CONTROL

- A. Inspection and testing shall be performed by the District's Testing Laboratory.
- B. Field inspection and testing will be performed by the District's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District Representative advance notice of paving scheduling. Sufficient "Advance Notice" shall be determined by the District Representative.
- C. If tests indicate materials do not meet specified requirement, replace material and retest at no additional cost to the District.
- D. Frequency of Test: As determined by the District's Testing Laboratory.

3.12 PROTECTION

- A. After placement, protect pavement from mechanical injury.

END OF SECTION

SECTION 32 16 00
CURBS, GUTTERS, SIDEWALKS

PART 1 – GENERAL

1.01 SUMMARY

- A. Concrete for curbs, gutters, sidewalks.

1.02 RELATED SECTIONS

- A. Section 31 20 00 – Earthwork

1.03 REFERENCES

- A. Standard Specifications for Public Works Construction (SSPWC), latest edition.
- B. ASTM Standards.

1.04 SUBMITTALS

- A. Submit the following:
 - 1. Product Data: Provide data on admixtures and curing compounds.
 - 2. Concrete mix design(s).
 - 3. Certificates from the batch plant.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with the SSPWC, latest edition; and ASTM Standards, latest edition.
- B. Obtain cementitious materials from same source throughout.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F or surface is wet.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

- A. Form Materials: Section 303-5 of the SSPWC.

2.02 CONCRETE MATERIALS

- A. Concrete Material for Curbs, Walk (Path of Travel), and Pavement:
 - 1. Class 520-C-2500 Portland cement concrete per Standard Specifications for Public Works Construction Section 201-1.1.2. Maximum slump shall be 4-inches.
 - 2. Concrete reinforcements shall be constructed per the Project Plans and Specifications.

2.03 ACCESSORIES

- A. Curing Compound shall conform to SSPWC Section 201-4. Pigmented compound shall not demonstrate any residual coloring of the concrete after one week.

2.04 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94.
- B. Use accelerating admixtures in cold weather only when approved by the District's Representative. Use of admixtures will not relax cold weather placement requirements.
- C. Use calcium chloride only when approved by the District 's Representative.
- D. Use set retarding admixtures during hot weather only when approved by the District 's Representative.

2.05 CONCRETE REINFORCEMENT

- A. Concrete reinforcement shall conform to SSPWC Section 201-2.2.3 and the Project Plans.

2.06 SOURCE QUALITY CONTROL

- A. Provide certificates of compliance from the batch plant.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support imposed loads.
- B. Verify gradients and elevations of subgrade are correct.

3.02 PREPARATION

- A. Moisten subgrade to minimize absorption of water from fresh concrete. Compact subgrade material to a depth of 12" beneath aggregate base below concrete pavements to 95% relative compaction.
- B. Notify District's Representative a minimum of 24 hours prior to commencement of concrete placement operations.

3.03 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with SSPWC Section 303-5.
- B. Install ½" thick fiberboard expansion joint and snap cap. Seal with Sikaflex self-leveling sealant after removal of snap cap (typical).
- C. Construct weakened plane joints conforming to SSPWC Section 303-5.4.3, one inch deep, at intervals not exceeding 10 feet.
- D. The top edges of curbs shall have 0.5" radius.

3.05 FINISHING

- A. Concrete finishes shall be per SSPWC Section 303-5.5.3.
- B. Portland cement concrete paving shall have a medium salt (medium broom) finish on all surfaces less than or equal to 5% and slip resistant (heavy broom finish) on all surfaces greater than 5%.
- C. Walkway grades in excess of 5% shall conform to requirements of Section 11B.403, California Building Code (2019 edition).
- D. Place curing compound in accordance with SSPWC Section 303-5.6 on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.06 FIELD QUALITY CONTROL

- A. Inspection and testing shall be performed by the District's Testing Laboratory.

- B. District 's Testing Laboratory will perform slump and compressive strength tests.
- C. Contractor shall maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.07 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, vandalism and mechanical injury.
- B. It is the Contractor's responsibility to replace all concrete work subject to vandalism and graffiti at no extra cost to the District.

END OF SECTION

SECTION 32 17 23.13

PAINTED PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. All striping and pavement markings shall be located per plans.
- B. All construction shall conform to the Standard Specifications for Public Works Construction, latest edition.

1.02 REFERENCES

- A. *Standard Specifications for Public Works Construction (SSPWC)*, latest edition.
- B. *Federal Standard 595B - Colors Used in Government Procurement*.
- C. *California Building Code (CBC)*, latest edition.
- D. *State of California Department of Transportation Standard Specifications (SSS)*, Caltrans, latest edition.

PART 2 - MATERIALS

2.01 FIELD QUALITY CONTROL

- A. All paint and related materials shall conform to Section 210.1 of the SSPWC.
- B. Painting and striping of the accessible parking stalls shall conform to the Architectural Plans.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Painted lines and markings on pavement shall be 3-inch minimum wide and white in color.

3.02 FIELD QUALITY CONTROL

- A. All pavement striping and markings shall conform to Section 310-5.6 of the SSPWC.

END OF SECTION

SECTION 32 8423
IRRIGATION SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes general requirements for the installation of the irrigation system.
- B. Work includes coordination with new shade structure foundations which require relocation of mainlines, control wires, and existing heads under proposed shade footprint.
- C. Related Sections:
 - 1. 32 9315 – Landscape Planting

1.02 CATALOG CUTS

- A. Ten (10) days after award of Contract submit to the District for approval, five (5) copies of all Manufacturer's catalog cuts, and specifications for all required products.

1.03 RECORD DRAWINGS

- A. The Contractor shall maintain a complete and accurate set of record drawings. These drawings shall be kept up to date with the progress of the Work. The Owner shall furnish a set of drawings on which to record drawing conditions. Record drawings shall be updated on a weekly basis.
- B. The Contractor shall indicate clearly and correctly Work installed differently from that shown on the Contract Drawings by dimensioning from two permanent points of reference. Show connections to existing water lines, ball valves, pressure supply pipe, control valves, quick couplers, and control wiring.
- C. On completion of the Work, the Contractor shall submit the completed Record Drawings to the Landscape Architect for transfer to electronic file. Once complete, this final electronic file shall be reviewed by the Contractor and certified as complete and accurate records of work as-built.

1.04 CONTROLLER CHARTS

- A. Reduce the approved irrigation record drawing to a size that will fit into the irrigation controller and remain legible. Color the chart with one color for each valve and its coverage area then have a printing company encapsulated the chart in 5 mil clear plastic. Install finished controller chart in the controller.

1.05 DRAWINGS

- A. For purposes of legibility, irrigation lines are essentially diagrammatic, although size and location of irrigation equipment are drawn to scale wherever possible. Make use of all data in all of the Contract Documents and verify this information at construction site.

1.06 MATERIALS TO BE FURNISHED

- A. Prior to final inspection, the Contractor shall furnish the following materials to the District: Two keys for each automatic controller, Two operating wrenches to manually open and close operating nut on gate valves.

PART 2 - PRODUCTS

2.01 GENERAL

A. Pipe Cable & Wire

1. Sleeving - Sch. 40 PVC and Class 200 PVC - 3 Pipe sizes larger than the pipe to be sleeved - 24" below grade. See pipe sleeving chart on irrigation plan, or as noted on irrigation plan.
2. Mainline - (Pacific Plastics) Class 315 PVC - Standard white color - 2" through 4" - Solvent weld - 24" below grade.
3. Mainline - (Pacific Plastics) SCH. 40 PVC - Standard white color - 1-1/2" & Smaller - Solvent weld 24" below grade.
4. Lateral - (Pacific Plastics) Schedule 40 PVC - Standard white color - 3/4" & Larger - Solvent weld - 12" below grade.
5. Irrigation wire – direct bury 14 AWG wire with colored PVC insulation. Paige wire Model P7001D or approved equal.

- B. Valve boxes for remote control valve assemblies and drip remote control valve assemblies shall be jumbo rectangular valve boxes 13" W x 24" L x 15" D rectangular, green lid, and locking bolt. Manufactured by NDS Model No. 222BCB or Carson Model No. 1324-15-Green or approved equal.

- C. Valves – Pressure Regulating Remote Control Valve - (Rain Bird) – EFB-CP-PRS-D Series - sizes noted - in a green colored Jumbo rectangular valve box.

- D. Solvents – PVC primer and solvents – As recommended by manufacturer. Weld-on, Christy, or equal.

- E. Flexible Sch. 40 PVC Hose-PVC Flex Hose – constructed from durable, UVR, S-0214 non-rigid PVC blend materials, furnished with algae resistant compound, solvent weld, black in color, with black PVC UVR fittings I.P.S. 3/8" size, manufactured by GPH Model GPVCSSAR050IRR (0.84") O.D., black in color or equal.

- F. PVC Main Line Fittings-Main Line Fittings for pipe sizes of 2" or less, shall be SCH. 80 PVC, Type 1, Grade 1, Cell Classification 12454-B, side gated, Lasco, Spears, or equal.
- G. Nipples and Risers-Nipples and Risers shall be PVC Schedule 80.
- H. Flood Bubblers – ½" FPT black plastic body, pressure compensating. GPH Irrigation Inc. model GPCBCV25, Hunter model PCB-25, or Rain Bird model 1401.
- I. Direct Bury Splice Kit-3M Model DBR-Y6 or Rain Master approved equal.
- J. Pop Up Turf Rotors manufactured by Hunter, Model PGP Ultra 120.
- K. Auto Controller shall be as per Drawings.
- L. Mainline Fittings for Mainline Pipe Sizes 2-1/2" through 4" size shall be ductile iron, epoxy coated, self-restraining fittings manufactured by Leemco Industries or approved equal.
- M. Mainline fittings for mainline pipe sizes 2" or smaller shall be Schedule 80 PVC, Type 1, Grade 1, Cell Class 12454-B, side gated, Lasco, Spears, or equal.
- N. PVC Lateral Line Fittings for all pipe sizes shall be SCH. 40 PVC, Type 1, Grade 1, Cell Classification 12454-B, side gated, Lasco, Spears, or equal.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

- A. Before starting Work on irrigation system, carefully check all grades to determine that Work may safely proceed, keeping within the specified material depths.
- B. Do not willfully install the irrigation system as indicated on the Drawings when it is obvious in the field those unknown obstructions, field dimensions, or grade differences exist, that might not have been considered in the engineering. Such obstructions or differences should be brought to the attention of the Landscape Architect.
- C. The installation of all irrigation materials, including pipe, shall be coordinated with the landscape Drawings to avoid interfering with the trees, shrubs, or other planting.
- D. Lay out irrigation heads and make any minor adjustments required due to differences between site and Drawings. Any such deviations in layout shall be within the intent of the original Drawings, and without additional cost to the District. When directed by the Landscape Architect the layout shall be approved before installation.

3.02 WATER SUPPLY

- A. Connections shall be existing main line as indicated on the drawing. Make connections, install new main, and perform all necessary work.

3.03 PIPE FITTINGS

- A. All plastic threaded pipe and fittings shall be assembled using non-hardening sealant
- B. All plastic slip fittings shall be solvent-welded as per pipe manufacturer's recommendations.

3.04 LINE CLEARANCE

- A. All lines shall have a minimum clearance of four inches from each other, and six inches from lines of other trades. Parallel lines shall be installed directly over one another.

3.05 TRACE WIRE

- A. 3" blue colored detectable marking tape "Irrigation Water", Christy model TA-DT-3-BIRR, or equal. Install 9" below grade directly over irrigation mainline.

3.06 TRENCHING

- A. Dig trench and support pipe continuously on bottom of ditch. Snake pipe in trench to an even grade as noted.
- B. Provide minimum cover of 24 inches for all pressure supply lines.
- C. Provide minimum cover of 24 inches for all control wires.
- D. Provide minimum cover of twelve inches for all other non-pressure lines.
- E. All lines under driveway and roadway pavement shall have a twenty-four inch minimum cover below sub-grade.

3.07 BACKFILLING

- A. Backfill for trenching shall be compacted to a dry density equal to the adjacent undisturbed soil, and shall conform to the adjacent grades without dips, sunken areas, humps, or other irregularities. Initial backfill on all lines shall be of a fine granular material with no foreign matter larger than one inch in size and six to eight inches deep.
- B. All irrigation lines under paving shall be backfilled entirely with sand and compacted.
- C. Trenches shall be backfilled promptly after the open trench inspection.
- D. After initial backfill placement of 15" over mainline, place caution tape and complete backfill.

3.08 CONTROL WIRES

- A. 24-volt conductors shall be U.F. type, solid wire, U.L. approved for direct burial. Minimum size shall be 14 Ga. or as noted on drawings, used to connect remote control valve solenoids to Calsense two wire decoders, Paige Wire or approved equal.

- B. Wiring shall occupy the same trench and shall be installed along the same route as the pressure supply line wherever possible.
- C. An expansion loop of 48" inches shall be provided at each wire connection and/or directional turn, along mainline run. Provide an expansion loop of 48" within all wire pull or splice boxes.

3.09 BUBBLERS

- A. Layout proposed planting design with marking flags to indicate tree locations. Obtain approval from the District before proceeding.
- B. Trench and install laterals. Install Schedule 40 PVC piping as per plan with flexible PVC tubing segments ending adjacent to each proposed plant location root ball. Refer to irrigation details for all installation requirements and specific equipment components.
- C. Flush system thoroughly and install pressure compensating emitters as per plan.

3.10 SLEEVING

- A. All lines under paving with PVC pipe with minimum 3 pipe sizes larger than the O.D. of the line to be sleeved. Refer to irrigation sleeving schedule on irrigation plan

3.11 FLUSHING THE MAINLINE

- A. Make provisions to flush new main line clean and protect existing main line and existing circuits from any debris.

3.12 FLUSHING THE SYSTEM

- A. After all new irrigation pipelines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of irrigation heads, the control valves shall be opened, and a full head of water used to flush out the system.

3.13 ADJUSTING OF SYSTEM

- A. Adjust valves, and alignment and coverage of all irrigation heads. Adjust head coverage so that no overspray hits walks and/or shade structure.
- B. If it is determined that adjustments in the irrigation equipment or nozzle changes will provide proper and more adequate coverage, make all necessary changes, without additional cost to the Owner, prior to any planting.
- C. The entire system shall be operating properly before any planting operations commence.
- D. Existing system, which may be affected by retrofit, should be tested for leaks, coverage, etc., before and after new installation is completed. Defective valves, etc., that were operable before installation must be repaired and/or replaced by the contractor.

3.14 CLEAN-UP AND REPAIR

- A. Upon completion of the Work, make the ground surface level, remove excess materials, rubbish, debris, etc., and remove construction and installation equipment from the premises. Dispose of in a safe and legal manner.
- B. Replace and/or repair to the satisfaction of the District all existing paving disturbed during the course of this work. New paving shall be the same type, strength, texture, finish, and be equal in every way to the material removed.

3.15 GUARANTEE

- A. The entire irrigation system shall be guaranteed by the Contractor as to material and workmanship, including settling of backfilled areas for a period of one year following the date of final acceptance of the work.
- B. This guarantee is in addition to, and not a limitation of, other rights the district may have under the Contract Documents.

END OF SECTION

SECTION 32 9020
LAWN RENOVATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Includes furnishing all labor, materials, and equipment required to provide the lawn renovation.

1.02 MAINTENANCE

- A. Includes continual maintenance of all landscape work included in the contract from the time all work is completed and approved until the end of the turf recovery period as per the general conditions.

1.03 REQUIREMENTS AND REGULATORY AGENCIES

- A. Any required spraying work shall be done in accordance with governing agencies.

1.04 SUBMITTALS

- A. Furnish material invoices indicating the quantities of fertilizers, soil amendments, and all materials delivered to the job site. Material invoices must be approved by the landscape architect prior to incorporating.
- B. Certificates shall be prepared by the supplier or distributor and shall indicate the quantities and qualities of materials used.

1.05 PROTECTION

- A. Contractor shall check or locate existing structures, electric cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of the operation. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the district for necessary action or decisions before resuming operation. contractor shall be responsible for repair or replacement at no cost to the district for features or conditions damaged through failure to comply with the above procedures.
- B. Protect existing trees and tree roots from any damage that may be caused as a result of any planting or irrigation operations.

1.06 ALTERNATES

- A. Alternates will not be permitted, except where indicated.

1.07 LANDSCAPE ON-SITE OBSERVATIONS

- A. The contractor shall notify the district forty-eight (48) hours in advance for all required on-site observations. the final on-site observation shall require seven days advance notice.
- B. The contractor shall submit for approval a complete work schedule indicating tentative dates for on-site observations.
- C. Record drawings shall be current and present at the time of on-site observations and shall be updated on a weekly basis.
- D. Landscape on-site observations shall be required for the following phases of work:
 - 1. Job start meeting.
 - 2. Finish grading - When all fine grading work is complete, notify the District and receive a favorable review prior to proceeding with the planting.
 - 3. Soil preparation - Furnish certificates for soil amendments at this time. Quantities must be approved by the district prior to incorporating into soil. When all soil preparation work is complete notify the District and receive approval prior to proceeding with the work.
 - 4. Irrigation system review - see irrigation section.
 - 5. Turf recovery period - When all work has been completed a pre-maintenance walk through shall be conducted and the contractor must receive approval by the District prior to starting the turf recovery period.
 - 6. Final review - After the turf recovery period is complete, notify the District for a final review of all work. all work must be approved by the District prior to being released.

1.08 GUARANTEE

- A. All plant material shall be guaranteed for one year. This guarantee is in addition to, and not a limitation of, other rights the District may have under the contract document.

PART 2 - PRODUCTS

2.01 ORGANIC AMENDMENTS

- A. Shall be Agromin, 'Agromend' or approved equal.

2.02 FERTILIZER

- A. Fertilizer shall be first grade commercial quality as specified.

2.03 SOIL

- A. Required import soil shall be clean sandy loam soil. Source shall be approved by District prior to delivery. Any imported soil shall comply with Greenbook Type A soil classifications.

2.04 LAWN

- A. Overseed mix for renovated lawn areas shall be Stover Manhattan GLR Perennial Rye at 5 lbs. per 1,000 sq. ft.

2.05 MAINTENANCE

- A. Maintenance materials used in conjunction with the maintenance work shall conform to the material requirements originally specified for the work.

2.06 TOP DRESSING

- A. Top dressing shall be Kellogg's Topper or approved equal.

2.07 GYPSUM

- A. Shall be agriculture gypsum, ground and suitable for soil application.

2.08 MIXES

- A. Soil preparation materials shall be:
 1. Three cubic yards organic amendments per 1000-sq. ft.
 2. Two pounds of nitrogen per 1000-sq. ft.
 3. Two pounds of phosphorus per 1000-sq. ft.
 4. Two pounds of potassium per 1000-sq. ft.
 5. Fifty pounds of gypsum per 1000-sq. ft.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

- A. No plant materials shall be planted until all operations in conjunction with the installation of the irrigation system has been approved by the District. Final grades shall be established, and the planting areas shall be properly prepared and graded.

3.02 LAWN RENOVATION

- A. After all irrigation system improvements are approved, and trenches are backfilled, apply enough water to lawn areas to bring the soil moisture to a level that will allow for sufficient soil plugs 2-3" to be removed using a core aerifier.

- B. Renovate lawn areas with “verticutter” machine as necessary to remove thatch to within ½” from soil level and sever turf stolons. Remove all thatch created during this process from site.
- C. After renovation, mow lawn areas to uniform height.
- D. Aerate lawn areas with core aerifier that pulls ½” diameter plugs 2-3” deep at a maximum spacing of 3” apart. leave on surface and grind with rotary mower.
- E. Apply seed mix uniformly throughout.
- F. Top dress seed with 1/8” thick layer of top dressing and roll with water ballast roller.

3.03

MAINTENANCE

- A. After all work indicated on the contract documents has been completed and has been approved by the district, the turf recovery period shall begin.
- B. Maintain all planted areas by means of continuous watering, weeding, mowing, re-seeding, re-sodding, spraying, mulching, trimming, edging, and any operation necessary for their care and upkeep.
- C. Lawn areas showing sparse growth or die back shall, within fifteen days of written notification be re-sodded or re-seeded with materials originally specified.
- D. Immediately repair any damage.
- E. Repair and maintain all temporary fencing.
- F. Depressions caused by vehicles, equipment and foot traffic will be filled with soil, leveled, and replanted.
- G. Exterminate gophers and moles. Repair damage as above.
- H. Clean up all planted areas and keep them free of debris. Cultivate and weed at not more than ten-day intervals.
- I. At completion of the turf recovery period, all areas included in the work shall be clean and free of debris and weeds; lawn shall be live, healthy, and free of infestation.
- J. Fertilizing (best turf supreme 16-6-8) shall be applied at ten pounds per 1,000-sq. ft. to all lawn areas twenty-five days after the maintenance period is initiated.

END OF SECTION

SECTION 32 9030

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes general requirements for the landscape maintenance.

1.02 MAINTENANCE PERIOD

- A. Once all landscape work is complete and approved by the District and all punch list items have been corrected and approved by the District, the Contractor will receive a written letter authorizing the start of the ninety-calendar day Landscape Maintenance period.

1.03 MAINTENANCE PERFORMANCE REVIEW SCHEDULE

- A. The Contractor shall schedule an on-site review with the District Inspector and the Landscape Architect to review the condition of the landscape area being maintained every (30) days during the maintenance period. If any deficiencies exist, a punch list will be issued for the Contractor to address immediately. Failure to perform any punch list item in a timely manner (within 5 business days), shall delay payment for that portion of the maintenance period until the identified punch list item has been corrected. If the project is being maintained in a professional manner, District reserves the right to waive progress inspections during the (90) day maintenance period.

1.04 FINAL LANDSCAPE APPROVAL AND TURNOVER TO DISTRICT

- A. At the end of the ninety-day maintenance period, the Contractor shall schedule an on-site inspection with the District Inspector and the Landscape Architect to determine if the landscape planting and irrigation is ready for the District to accept. If the landscape is not ready for acceptance, a punch list will be prepared for the Contractor to complete, and the maintenance period will extend until the punch list items have been approved by the District Inspector.

1.05 MAINTENANCE INSPECTION NOTIFICATIONS

- A. A minimum of 48 hours is required when scheduling a maintenance on-site review.

1.06 REQUIREMENTS OF REGULATORY AGENCIES

- A. Any required spraying work shall be done in accordance with governing agencies and the District policies. No spraying shall occur without prior written approval from the District.

PART 2 - PRODUCTS

- 2.01 All materials used in conjunction with the maintenance work shall conform to the material requirements originally specified for the work. Apply at Manufacturer's recommended rate

PART 3 - EXECUTION

3.01 PEST AND DISEASE CONTROL

- A. Provide rodent, insect, pest, and disease control services at the first sign or symptom of infestations, or as directed by the District.
- B. Notify the District at the first sign or symptom of pest or disease.
- C. Perform pest and disease control services in accordance with the District policies.

3.02 TREE AND SHRUB CARE

- A. Tree pruning shall include the removal of broken, dead, or crossed branches and removal of sucker growth. Tree guys and staking shall be visually inspected and maintained in a secure manner.
- B. All walkways shall be kept clear for safe pedestrian passage.
- C. Shrub care shall include the clearance of mulch and any debris that accumulates around the shrub crown.
- D. Shrub areas shall be kept weed free by manually removing any weeds that appear on the weekly visit.
- E. If any plant dies for any reason or is damaged for any reason during the maintenance period, the Contractor shall replant as originally specified at no cost to the District.

3.03 IRRIGATION SYSTEMS

- A. Irrigation system maintenance shall include, operating, adjusting, and repairing the irrigation system to perform as designed.
- B. On each visit, visually and hydraulically inspect the irrigation system to ensure that no sprinkler breakage has occurred, no foreign matter is clogging the sprinkler heads and that sprinkler coverage and arc of sprays is proper and shall correct any other inadequacies that might impair the proper performance of the irrigation system. Minor irrigation repairs shall be accomplished by the weekly maintenance crew as needed with the like kind materials unless otherwise authorized by the District.
- C. Malfunctioning valves shall be brought to the attention of the District for approval of appropriate repair.
- D. Notify the District immediately of any system failure or disruption in order that steps can be taken to rectify the problem.

3.04 HARDSCAPED AREAS

- A. Maintain all hardscape areas weed-free. Use of chemicals is elective with Contractor, subject to prior approval by District Inspector, and shall conform as specified. The use of toxic chemicals shall require proof of proper permit for use on this jobsite. Weed control shall be performed as often as needed or required.

3.05 IRRIGATION SCHEDULING

- A. At least once every two weeks, the Contractor shall review water requirements of the project by probing in at least one area covered by each sectional valve and ascertaining the anticipated water requirements, adjusting the automatic controller accordingly. Particular attention shall be given to avoid applying more water than the soil can absorb at one time. Where more water is required than the soil can take at one time, Contractor shall set the automatic timer for repeat cycles at short intervals to satisfy the ultimate water demand. In no cases shall water be allowed to run across the surface of the ground.

END OF SECTION

SECTION 32 9315
LANDSCAPE PLANTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes requirements for the installation of the plant material.
- B. Related Section:
 - 1. 32 8423 – Irrigation System
 - 2. 32 9020 – Landscape Maintenance

1.02 SUBMITTALS

- A. Furnish material invoices indicating the quantities of fertilizers, soil amendments, and all materials delivered to the job site. Material invoices must be approved by the Landscape Architect prior to incorporating soil amendments. Certificates shall be prepared by the supplier or distributor and shall indicate the quantities and qualities of materials used.
- B. Plant Material – Submit clear photos of all plant material specified taken and the source. Indicate plant material height and spread measured at the source. Photos must clearly show the plant quality and size. The Landscape Architect will determine if the photos meet the specifications and if further site inspection at the nursery is required or if another source is required to produce the specified plant material.

1.03 PROTECTION

- A. Contractor shall check or locate existing structures, electric cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of the operation. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the District for necessary action or decisions before resuming operation. Contractor shall be responsible for repair or replacement at no cost to the District for features or conditions damaged through failure to comply with the above procedures.

1.04 ALTERNATES

- A. Alternates will not be permitted, except where indicated, and as approved by the Landscape Architect.

1.05 LANDSCAPE ON-SITE OBSERVATIONS

- A. The Contractor shall notify the district and the Landscape Architect forty-eight (48) hours in advance for all required On-Site Observations. The final On-Site Observation shall require seven (7) days advance notice.

- B. The Contractor shall submit for approval a complete work schedule indicating tentative dates for On-Site Observations.
- C. Record drawings shall be current and present at the time of On-Site Observations and shall be updated on a weekly basis.
- D. Landscape On-Site Observations shall be required for the following phases of Work
 - 1. Job start meeting.
 - 2. Finish grading - When all fine grading work is complete, notify the Landscape Architect for approval prior to proceeding with the planting.
 - 3. Soil Preparation - furnish certificates for soil amendments at this time. Quantities must be reviewed by the Landscape Architect prior to incorporating into soil. When all soil preparation work is complete notify the Landscape Architect for approval prior to proceeding with the work.
 - 4. Irrigation System Review - See Irrigation Section.
 - 5. Review plant material for quality prior to planting. The Landscape Architect has the right to reject any plant material that it deems unacceptable at time of delivery.
 - 6. Review planting during the planting process.
 - 7. Review planting after installation.
 - 8. Pre-maintenance - When all Work has been completed a pre-maintenance walk thru shall be conducted and the contractor must receive approval from the District prior to starting the maintenance period.
 - 9. Maintenance - Notify the District and the Landscape Architect after the maintenance period has progressed for thirty days for a review of all work and make all corrections that are deemed necessary.
 - 10. Final Review - After the ninety-day (90) maintenance period is complete notify the District and the Landscape Architect for a final review of all work. All work must receive approval from the District and the Landscape Architect prior to being deemed complete and or filing a notice of completion.

1.06 QUALITY

- A. All plant material shall have a growth habit normal to the species and shall be sound, healthy, vigorous, and free from insect pests, plant diseases, sun scalds, fresh bark abrasions, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and well "hardened off." All plants shall have normal well-developed branch systems, and vigorous and fibrous roots systems which are neither root- nor pot-bound and are free of kinked or girdling roots.

1.07 GUARANTEE

- A. All plant material shall be guaranteed for one year. This guarantee is in addition to, and not a limitation of, other rights the District may have under the Contract Document.

PART 2 - PRODUCTS

2.01 MATERIALS – LANDSCAPE

- A. Trees: varieties, sizes, and quantities, as noted on plans.
- B. Tree Stakes: Tree Stakes shall be 3” diameter Lodgepole pine, pressure treated with Chemonite (ACZA) @ .40 pounds per cubic foot, for in-ground rating. Stakes shall be 10 feet long. Horizontal supports shall be 1x6 cedar.
- C. Tree Ties: Tree Ties shall be virgin flexible vinyl, meeting ASTM-D-412, with U.V. inhibitor. 24" inches long. (Cinch Ties of eq.)
- D. Soil Amendments: Organic soil amendment shall be Agromin “Agromend,” or equal.
- E. Mulch: Agromin model `ES-2` – Finish grade soil in all planters to a smooth uniform surface suitable for both weed fabric and mulch installation. Install weed fabric first then cover weed fabric with a three-inch layer of mulch throughout shrub and tree planters. Keep mulch away from direct contact with both shrub and tree crowns. Dress mulch areas to present a clean, uniform appearance when completed.
- F. Weed Fabric: Mirafi model `Mscape` install on all shrub and mulch covered planting areas. Secure fabric to soil using 6” long metal soil staples spaced 5’-0” o.c. in a triangular pattern.
- G. Backfill Material shall be:
1. 1/3 organic soil amendment
 2. 2/3 existing site soil.
 3. Commercial Fertilizer (15-15-15), 1 lb./cu. yd.
 4. Iron, Zinc, Manganese, 1 oz./cu. yd.
- H. Soil preparation materials per 1,000 square feet:
1. Four cubic yards of organic soil amendment
 2. Commercial Fertilizer (15-15-15), eight pounds

2.02 ROOT BARRIERS

- A. Shall be linear barriers 24” deep by 2 feet long attached to the length as per plan; manufactured by Deeprout or equal

PART 3 - EXECUTION

3.01 SITE CONDITION

- A. No plant materials shall be planted until all operations in conjunction with the installation of the irrigation system have been approved by the District and the Landscape Architect. Final grades shall be established, and the planting areas shall be properly prepared and graded.

3.02 GROUND PREPARATION – ALL AREAS

- A. After the Site Clearance and Preparation has been approved by the District, planted areas shall be thoroughly cultivated to a depth of six inches to reduce any compaction, which occurs as a result of construction. Protect existing tree roots.
- B. Stones or rocks over 1” in size, construction refuse, and other deleterious material shall be removed from the site, safely and legally disposed of.
- C. Apply soil preparation materials to all planting areas and thoroughly incorporate into the top six inches of soil or as directed by soil scientist report.
- D. Wet soil thoroughly and allow to settle. Repeat this compaction procedure until soil is stable enough to permit aeration and drainage for plant material.
- E. Finish grade all planting areas to a smooth, uniform surface ready for planting. Finish grade shall be one inch below finish grade of adjacent paved surfaces unless otherwise noted on Drawings.

3.03 TREE STAKING

- A. Stake each tree with four lodge pole stakes, firmly set into the grade and in alignment forming a square. Secure the four poles with 1x6 cedar horizontal supports, attach with deck screws. Secure tree trunk with cinch ties

3.04 PLANTING – TREES & SHRUBS

- A. Trees and shrub planting shall comply with details on drawings.
- B. Make necessary adjustments and excavate pits of square outline and vertical sides for all plants. Scarify sides and bottoms of all plant pits. Set trees vertical.
- C. Protect roots or ball of plants at all times from sun and drying winds.
- D. If directed by the Landscape Architect, the Contractor shall prune plants in accordance with standard horticultural practice.
- E. Wet soil thoroughly and allow to settle. Repeat this compaction procedure until soil is stable enough to permit aeration and drainage for plant material.

3.05 ROOT BARRIER

- A. Install tree root barriers in the total lengths as shown on the plans and details. The vertical root deflecting ribs shall be facing inwards to the rootball, and the double top edge shall be set 2 inches above the finish grade. Panels shall be connected with the flexible joiner strips to the required overall length. Install panels straight, uniform in a vertical position.

3.06 MULCH

- A. Install three-inch layer of mulch throughout shrub areas. Finish grade shrub areas to a smooth uniform surface to receive mulch. Keep mulch away from tree and shrub crown. Dress mulch areas to present a clean uniform appearance when complete.

3.07 LANDSCAPE WEED FABRIC

- A. Applied throughout all planting areas. Overlap fabric six inches and staple with 6-inch galvanized staples at 24 inches along the border and 36 inches in the field. Cut out just enough room for the shrub and tree planting pit. Secure the fabric around each planting pit with staples.

END OF SECTION

SECTION 32 9335

SOD LAWN PLANTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes general requirements for the installation of the sod lawn planting.

1.02 RELATED SECTIONS

- A. Section 32 8423 – Irrigation Systems.
- B. Section 32 9030 – Landscape Maintenance.

1.03 SUBMITTALS

- A. Furnish material invoices indicating the quantities of fertilizers, soil amendments, and all materials delivered to the job site. Material invoices must be approved by the Landscape Architect prior to incorporating soil amendments. Certificates shall be prepared by the supplier or distributor and shall indicate the quantities and qualities of materials used.
- B. Sod Lawn – Submit Sod Company’s catalog and sheet with complete description of the specified sod.

1.04 PROTECTION

- A. Contractor shall check or locate existing structures, electric cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of the Work. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the District for necessary action or decisions before resuming operation. Contractor shall be responsible for repair or replacement at no cost to the District for features or conditions damaged through failure to comply with the above procedures.
- B. Protect existing trees and tree roots from any damage that may be caused by the Work.

1.05 ALTERNATES

- A. Alternates will not be permitted, except where indicated, and as approved by the District.

1.06 QUALITY

- A. Sod lawn shall have a normal growth habit full and uniform throughout, and shall be sound, healthy, vigorous, and free from insect pests, and all fungal Lawn diseases.

1.07 GUARANTEE

- A. Lawn sod shall be guaranteed for the entire maintenance period.

PART 2 - PRODUCTS

2.01 MATERIALS – LANDSCAPE

- A. Soil Amendments: Organic soil amendment shall be Agromin “Agromend” or equal.
- B. Sod Lawn: GN-1 Hybrid Bermuda as grown by Pacific Sod Farms.
- C. Soil preparation materials per 1,000 square feet:
 - 1. Three cubic yards of organic soil amendment.
 - 2. Commercial Fertilizer (15-15-15), eight pounds.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

- A. Sod lawn shall be planted when all operations in conjunction with the installation of the irrigation system, fine grading, and soil preparation have been approved by the District.

3.02 LAWN – SOD

- A. Grade area above decomposed granite path to 4:1 max slope that blends smoothly with existing lawn area.
- B. After soil prep and fine grading is complete roll lawn areas with a water ballast roller to create even surface. Soil should be moist to a depth of six inches.
- C. To lay sod, select a starting point parallel to the longest straight boundary of the area. Stagger the strips and avoid overlapping edges. Avoid cutting the sod in short narrow strips. Butt edges and ends of sod so that they fit tightly, with no overlapping. Avoid standing or kneeling on sod while it is being laid. After sod is installed, roll lightly to squeeze out air pockets.

END OF SECTION

SECTION 32 9340

DECOMPOSED GRANITE PATH

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes general requirements for the installation of the decomposed granite path that is cut into the existing lawn area.

1.02 SUBMITTALS

- A. Submit three (3) samples of decomposed granite in one-quart clear bags for review and approval along with all other Manufacturer's product specification sheets for pins, fabric, and stabilizer.

PART 2 - PRODUCTS

2.01 DECOMPOSED GRANITE

- A. Decomposed granite shall be ¼" minus 'California Gold' as available at Southwest Boulder and Stone (877/792-7625) or approved equal.

2.02 DECOMPOSED GRANITE STABILIZER

- A. Decomposed granite stabilizer shall be Technisoil G3 pathway stabilizer at the rate of 1 gallon per 20 sq. ft. or approved equal unless the DG is stabilized at the plant.

2.03 LANDSCAPE FABRIC

- A. Landscape fabric shall be Mirafi M-Scape Geosynthetics for non-woven landscape applications or approved equal.

2.04 FABRIC PINS

- A. Fabric pins shall be 6" x 1" x 6", 11 gauge galvanized "U" pins.

PART 3 - EXECUTION

3.01 SITE PREPARATION

- A. Scarify the existing soil area a minimum of six inches, moisture condition, and compact to 90% relative compaction. Finish the surface to a uniform gradient with no variation greater than ½ inch throughout the area.
- B. Install the landscape fabric throughout the and tightly up to and around the boulders. Lay fabric smooth and uniform throughout the D.G. area after the subbase has been approved by the District Inspector. Secure with pins at 24" on center around the perimeter and at 36 inches on center throughout the field. Along the edge conditions, bury the fabric a minimum of 3 inches into the compacted subgrade.

- C. Place a 3-inch layer of decomposed granite. Evenly grade using landscape rakes then apply Technisoil G3 pathway stabilizer, evenly and thoroughly at the rate of 1 gallon per 20 sq. ft. After G3 is fully absorbed into material, compact surface to 95% using vibrator plate compactor. After compaction, the section of D.G. must be a minimum of 3 inches throughout.
- D. Shovel cut the existing lawn edge at the lower path edge. The existing lawn at the upper grade of the path shall be regraded to a 4:1 max slope that blends smoothly with the existing lawn.

END OF SECTION

SECTION 33 10 00

WATER UTILITIES
Private & Public

PART 1 – GENERAL

1.01 SUMMARY

- A. Pipe and fittings for site water lines.
- B. Valves.
- C. Fire hydrant.
- D. Fire Department Connection.
- E. Backflow preventer.

1.02 RELATED SECTIONS

- A. Section 31 20 00 Earthwork.
- B. Section 31 23 33 Trenching and Backfilling.

1.03 REFERENCES

- A. American Water Works Association Standards (AWWA).
- B. Standard Specifications for Public Works Construction (Green Book), latest edition.

1.04 SUBMITTALS

- A. Submit the following:
 - 1. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories.
 - 2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - 3. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Turn over to the project manager one set of drawings with all deviations from the plans shown in neat, clean and readable red ink.
 - 4. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
 - 5. Disinfection Report:

- a. Type and form of disinfectant used.
 - b. Date and time of disinfectant injection start and time of completion.
 - c. Test locations.
 - d. Name of person collecting samples.
 - e. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
 - f. Date and time of flushing start and completion.
 - g. Disinfectant residual after flushing in ppm for each outlet tested.
6. Bacteriological Report:
- a. Date issued, project name, and testing laboratory name, address, and telephone number.
 - b. Time and date of water sample collection.
 - c. Name of person collecting samples.
 - d. Test locations.
 - e. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
 - f. Coliform bacteria test results for each outlet tested.
 - g. Certify water conforms, or fails to conform, to bacterial standards of AWWA C651 Section 7.1 Standard Conditions
7. Water Quality Certificate: Certify water conforms to quality standards of City of Moorpark, suitable for human consumption.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of piping mains, valves, connections, fire hydrant, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with County of Ventura Standards, AWWA, Standard Specifications for Public Works Construction California Fire Code Chapters 5 & 33 and NFPA 24.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.07 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years experience.
- B. Testing Firm: Company specializing in testing potable water systems, certified by State of California.

- C. Submit bacteriologist's signature and authority associated with testing.

1.08 DELIVERY AND STORAGE

- A. Deliver and store valves in shipping containers with labeling in place.

PART 2 – PRODUCTS

2.01 PIPE

- A. Joints: Mechanical joints shall be used for the waterline construction unless otherwise shown on plans and standard details. Gaskets for mechanical joints shall be rubber conforming to ANSI A21.11 and AWWA C111.
- B. Fittings: Fittings for pipe size 4-inch diameter and larger shall be ductile iron rated for 250 psi working pressure. Mechanical joint fittings shall conform to ANSI A21.10 or AWWA C110 (short short body style, not approved). Lining for fittings shall be Plastic Engineering P.E.I. 100 epoxy to a minimum thickness of 10 mils. Fittings shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapped with the polyethylene sheet.
- C. Pipe size smaller than 4-inch diameter: pipe material shall be polyvinyl chloride (PVC) schedule 80 solvent weld pipe and shall be manufactured in accordance with ASTM D-1785, or type K Copper pipe shall be used as indicated on plans.
- D. Pipe size equal or larger than 4-inch diameter: pipe material shall be AWWA C900 Class 305 with AWWA C1101 ductile iron fittings and ASTM D3139 compression gasket rings.

2.02 GATE VALVES

- A. Not Applicable.

2.03 FIRE HYDRANT

- A. Not Applicable.

2.04 WATER METER

- A. Not Applicable.

2.05 BACKFLOW PREVENTER AND FIRE DEPARTMENT CONNECTION

- A. Fire water line backflow preventer and Fire Department Connection shall have a OS & Y gate valve and a one-way check valve per the Plans.

- B. Backflow preventer shall be lead free and USC approved. Wilkins 350 DA Double Check Detector Assembly.

2.06 ACCESSORIES

- A. Concrete for Thrust Blocks shall have a minimum 28-day compressive strength of 2,000 psi.
- B. Thrust blocks shall be constructed to bear against undisturbed earth and shall not bear against adjacent pipe, fittings, or valves. Where concrete must be poured around adjacent pipe, a block out or a short pipe length shall be used such that a flexible joint exists within 12 inches of each side of thrust block, unless indicated otherwise on the plans. Concrete shall not be allowed to set in contact with pipe surfaces or to enter or come in contact with any joint.
- C. Valve box body shall be unreinforced concrete 8 ¾" inside diameter traffic box with cast iron ring. The valve box cover shall be cast iron. Both valve body and cover shall be Christy G3 or equal. The cover shall be marked "water." The cover of each valve box shall be provided with a 2" diameter bronze disc and the Contractor shall stamp the valve number on the disc per the Architect's instructions. The disc shall be mounted to the valve box cover or higher using stainless steel screws. The extension piece shall be 8" in diameter, Class 150 P.V.C. water line conforming to the requirements of AWWA C-900.
- D. Appropriate warning detector tape shall be placed over all utilities.
 - 1. Underground detectable warning tape shall be placed over all non-metallic underground utilities.
 - 2. 12-gauge copper continuous location wire shall be placed on all water mains.
- E. Corrosion-Protection Encasement for Piping
 - 1. Encasement for Underground Metal Piping and Fittings: AWWA C105, Polyethylene film, 10 mil minimum thickness, tube or sheet. Plastic wrap shall be clear or black. Purple wrap shall not be used.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Maintenance records in accordance with NFPA 25.
- B. Verify the existing water main sizes, class of pipes, and locations as indicated.
- C. Verify piping system has been cleaned, inspected, and pressure tested.

- D. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 PREPARATION

- A. Remove scale and dirt, on inside and outside, before assembly.
- B. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

- A. Excavate pipe trench in accordance with Specification Section 31 23 33 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to a minimum of 95 percent relative compaction.
- C. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe. Jetting is not permitted to obtain required compaction.
- D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

- A. Route pipe in straight line.
- B. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- C. Install access fittings to permit disinfection of water system.
- D. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main.
- E. Protect metal restrained joint components against corrosion by applying a bituminous coating by coating with non-oxide corrosion resistant greased 10 mil plastic wrap.
- F. Establish elevations of buried piping to ensure cover conforming to District Standards. The minimum cover from the finish grade to the top of pipe is 36 inches for potable and fire waterline, any shallower cover to clear with the existing utility crossings shall be reviewed and approved by the District's Representative.
- G. Install 12-gauge copper continuous location wire over top of pipe.
- H. Backfill trench in accordance with Specification Section 31 23 33.
- I. Maintain separation of water main from sewer piping in accordance with the State Department of Health Services, Criteria for the Separation of Water Mains and Sanitary

Sewers (Section 64630, Title 22 California Administrative Code), and State Regional Water Quality Control Board.

- J. All pipe laid in trench which is to be left for further extension (i.e., end of work day) shall have its open end covered to protect from possible rodent intrusion.

3.05 INSTALLATION - VALVES

- A. Set valves on solid bearing per County of Ventura Standard Plans & Specifications.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Install brass valve 1 ½" diameter tags and imprint valve number per District.

3.06 SERVICE CONNECTIONS

- A. Not Used

3.07 PRESSURE TEST OF WATER PIPING SYSTEM

- A. Water piping system shall be pressure tested for 2 hours at 200 psi, with no allowable drop in water pressure.
- B. All leakage tests shall be completed and approved prior to placing of permanent resurfacing.
- C. Pressure test shall be witnessed by District's inspector.

3.08 DISINFECTION AND BACTERIA TESTING OF WATER PIPING SYSTEM

- A. Water piping system shall be disinfected and flushed per AAWA Section C651.
- B. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
- C. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
- D. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

3.09 TEST RECORDS

- A. Records shall be in accordance with NFPA 13 & 24. Records shall be made of each piping system installation during the test. These records shall include:

1. Date of test.
2. Description and identification of piping tested.
3. Test fluid.
4. Test pressure.
5. Remarks to include such items as:
 - a. Leaks (type, location).
 - b. Repairs made on leaks.
6. Certification by Contractor and signed acknowledgment by the District's Representative.

3.10 FIELD QUALITY CONTROL

- A. Inspection and testing shall be performed by District's Representative.
- B. Perform pressure test on potable water distribution system in accordance with County of Ventura Standard Plans & Specifications except that there is no allowable leakage for the duration of the test.
 1. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.
 2. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.

END OF SECTION