



LOS MEDANOS COLLEGE

Pittsburg, California

L-612 Office of Instruction / Second Floor Interim Remodels College Complex

tBP Project No. 20670.06

DSA APP. # 01-112012

FILE # 7-C1

BID DOCUMENTS
MARCH 31, 2011

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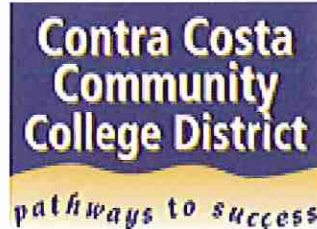
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SECTION 00007

SEAL PAGE



PROJECT MANUAL INCLUDING SPECIFICIATIONS

FOR

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

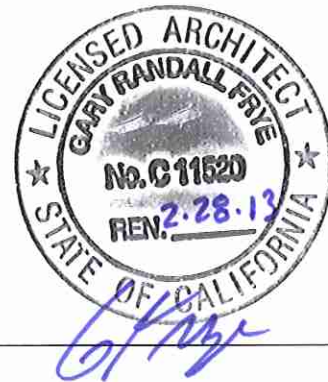
LOS MEDANOS COLLEGE

**OFFICE OF INSTRUCTION /
SECOND FLOOR INTERIM REMODELS – COLLEGE COMPLEX**

DISTRICT PROJECT # L-612

tBP/Architecture PROJECT # 20670.06

DSA FILE ## 7-C1 DSA APPLICATION # 01-000000



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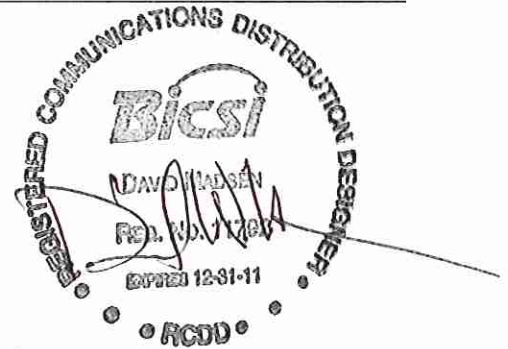
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SECTION 00010

TABLE OF CONTENTS

DIVISION 0 - PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

Section 00001 Title Page
Section 00007 Seal Page

DIVISION 02 EXISTING CONDITIONS

Section 02225 Selective Demolition

DIVISION 03 CONCRETE NOT USED

DIVISION 04 MASONRY NOT USED

DIVISION 05 METALS NOT USED

DIVISION 06 WOOD AND PLASTICS

Section 06114 Wood Blocking and Curbing

DIVISION 07 THERMAL AND MOISTURE PROTECTION

Section 07900 Joint Sealers

DIVISION 08 DOORS AND WINDOWS

Section 08110 Steel Doors and Frames
Section 08310 Access Doors and Panels
Section 08410 Metal-Framed Storefronts
Section 08710 Door Hardware
Section 08800 Glazing

DIVISION 09 FINISHES

Section 09260 Gypsum Board Assemblies
Section 09511 Suspended Acoustical Ceilings
Section 09685 Carpet Tile
Section 09850 Acoustical Panels
Section 09900 Paints and Coatings

DIVISION 10 SPECIALTIES

Section 10100 Visual Display Boards
Section 10400 Identification Devices
Section 10523 Fire Extinguishers and Cabinets

DIVISION 12 FURNISHINGS

Section 12493 Blinds

DIVISION 15 MECHANICAL

Section 15010	Basic Mechanical Requirements
Section 15040	Acceptance Testing and Documentation
Section 15250	Insulation
Section 15890	Ductwork
Section 15910	Ductwork Accessories
Section 15990	Testing, Adjusting and Balancing

DIVISION 16 ELECTRICAL

Section 16010	Basic Electrical Requirements
Section 16040	Building Lighting Acceptance Testing and Documentation
Section 16050	Basic Materials and Methods
Section 16400	Panelboards
Section 16500	Lighting
Section 16906	Occupancy Sensors

DIVISION 17 TELECOMMUNICATIONS

Section 17730	Communications
Section 17731	Pathways for Communications Systems
Section 17732	Communications Equipment Room Fittings
Section 17735	Identification for Communications Systems
Section 17740	Structured Cabling

END TABLE OF CONTENTS

SECTION 02225

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alterations purposes.
- B. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Hazardous Materials Survey Report
- B. Section 01010 - Summary Of Work: Limitations on Contractor's use of site and premises.
- C. Section 01500 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01722 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- E. Section 01732 - Construction Waste Management: Limitations on disposal of removed materials; requirements for recycling.

1.03 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Demolition Plan: Submit demolition plan as specified by Cal OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.04 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of three years of documented experience.
- B. Minimize production of dust due to demolition operations; do not use water if that will result in flooding, sedimentation of public waterways or storm sewers, or other pollution.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

A. Interior:

1. Demolition and removal of designated storefront systems and glazing.
 - a. Salvage, clean, inventory, protective wrap storefront system, palletize system and turn over to Owner for reuse.
2. Demolish and remove walls, floor finishes and adhesives, swing doors, sliding glass doors, and windows as indicated on drawings.
 - a. Salvage, inventory and protective wrap sliding glass doors and turn over to Owner for reuse. Protect glass in doors from breaking.
 - b. Salvage, inventory and protective wrap chair rails and turn over to Owner for reuse.
 - c. Salvage, inventory and protective wrap doors and associated hardware. Turn over to Owner for reuse.
 - d. Salvage, inventory and protective wrap visual display boards, including white boards and chalk boards and turn over to Owner for reuse.
3. Demolish and remove casework.
4. Demolish and remove existing sink indicated on drawings. Cap piping flush to (E) concrete wall. Salvage sink and deliver to Owner.
5. Remove floor covering, nail strips, adhesive and accessories where indicated on plans.
6. Demolish and remove other items indicated, for salvage, relocation, and recycling.
7. Demolish and remove interior partitions, doors and glazing systems
 - a. Salvage, inventory and protective wrap glazing system and turn over to Owner for reuse.
8. Demolish and remove existing fire-alarm system as indicated on drawings.
 - a. Provide fire watch any time that system is inoperable for the remainder of the building.
9. Demolish and remove electrical systems, including lighting fixtures and controls.
 - a. Salvage, inventory and protective wrap surface-mounted and recessed lighting fixtures and turn over to Owner for reuse.
10. Demolish and remove low voltage raceways, cable trays, wiring devices, conduit etc as indicated on drawings.
11. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill to relative compaction levels as specified.
12. Provide an index of salvaged items turned over to owner. List sizes where appropriate such sliding glass doors, swing doors, and marker boards.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 6. Do not close or obstruct roadways or sidewalks without permit.
 - 7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Comply with requirements of Section 01505 - Construction Waste Management.
 - 2. Dismantle existing construction and separate materials.
 - 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities. Cap below floor or above ceiling.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings in locations indicated on drawings.
 - 2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.
 - 3. Maintain access to Room 256 at all times.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.

4. Patch as specified for patching new work.
- G. Record new conditions: Accurately record actual locations of capped and active utilities and subsurface construction in Record Drawings, See Section 01770 Contract Closeout Procedures.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; Comply with requirements of Section 01505 Construction Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 06114

WOOD BLOCKING AND CURBING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Blocking in wall openings.
- B. Wood furring and grounds.
- C. Fire retardant treatment of wood.
- D. Preservative treatment of wood.
- E. Telephone and electrical panel boards.

1.02 SUBMITTALS

- A. See Section 01330 - Submittals, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.

1.03 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
 - 1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
- B. Plywood: Comply with PS 1.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER

- A. Grading Agency: Western Wood Products Association (WWPA).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Miscellaneous Blocking, Furring, and Nailers:
 - 1. Lumber: S4S, No. 3 or Utility Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Plywood Sheathing: PS 1, Grade C-D, Exposure I.
- B. Particleboard Sheathing: ANSI A208.1, Grade M-3 EXTERIOR GLUE.
- C. Miscellaneous Panels:
 - 1. Concealed Plywood: PS 1, C-C Plugged, exterior grade.

2. Exposed Plywood: PS 1, A-D, interior grade.
3. Electrical Component Mounting: APA rated sheathing, fire retardant treated.

2.04 ACCESSORIES

A. Fasteners and Anchors:

1. Fasteners: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and treated wood locations, unfinished steel elsewhere.
2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment, Exterior Type: AWPA Use Category UCFB, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), chemically treated and pressure impregnated, maximum flame spread rating of 25 when tested in accordance with ASTM E 84 and with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D 2898; kiln dried after treatment to maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 1. Basis of Design: Product: Exterior Fire-X manufactured by Hoover Treated Wood Products, www.frtw.com. or approved equal.
- C. Fire Retardant Treatment, Interior Type A: AWPA Use Category UCFA, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), low temperature (low hygroscopic) type, chemically treated and pressure impregnated, maximum flame spread rating of 25 when tested in accordance with ASTM E 84 and with no evidence of significant combustion when test is extended for an additional 20 minutes; kiln dried after treatment to maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 1. Basis of Design: Product: Pyro-Guard manufactured by Hoover Treated Wood Products, www.frtw.com. or approved equal.
- D. Preservative Pressure Treatment of Lumber Above Grade: AWPA Use Category UC3B, Commodity Specification A (Treatment C2) using waterborne preservative to 0.25 lb/cu ft retention.
 1. Kiln dry after treatment to maximum moisture content of 19 percent.
 2. Treat wood in contact with roofing, flashing, or waterproofing.
 3. Treat wood in contact with masonry or concrete.
 4. Treat wood less than 18 inches above grade.
- E. Preservative Pressure Treatment of Plywood Above Grade: AWPA Use Category UC2 and UC3B, Commodity Specification F (Treatment C9) using waterborne preservative to 0.25 lb/cu ft retention.
 1. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 2. Treat plywood in contact with roofing, flashing, or waterproofing.
 3. Treat plywood in contact with masonry or concrete.
 4. Treat plywood less than 18 inches above grade.

- 5. Treat plywood in other locations as indicated.
- F. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 FRAMING INSTALLATION

- A. Set members level and plumb, in correct position.
- B. Place horizontal members with crown side up.
- C. Construct curb members of single pieces.
- D. Space framing and furring members 16 inches o.c.
- E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- F. Coordinate curb installation with installation of decking and support of deck openings.
- G. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.02 INSTALLATION OF CONSTRUCTION PANELS

- A. Sheathing: Secure with long dimension perpendicular to framing members, with ends over firm bearing and staggered, using nails, screws, or staples.
- B. Install telephone and electrical panel back boards made of plywood or other acceptable structural panels at locations indicated. Size back boards to be minimum 96 inches beyond size of telephone and electrical panels.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.04 SCHEDULES

- A. Telephone and Electrical Panel Boards: 1/4 inch thick, plywood or particleboard, fire retardant treated.

END OF SECTION

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.03 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.05 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.06 WARRANTY

- A. See Section 01740 - Warranties and Guarantees, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 SEALANTS

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Type SJ-1 - General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
 - 1. Color: Standard colors matching finished surfaces.

2. Product: Dymeric 240FC manufactured by Tremco.
 3. Substitutions: See Section 01625 - Product Options and Substitutions.
 4. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
- C. Type SJ-2 - Silicone Sealant: ASTM C 920, Grade NS, Class 50, uses NT, A, G, M, O; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding.
1. Product: 925 Silicon Building Sealant by Dow Corning; www.dowcorning.com.
 2. Substitutions: See Section 01625 - Product Options and Substitutions.
 3. Applications: Use for
 - a. Sealant at exterior glass.
- D. Type SJ-3 - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring. This product is for exterior use only.
1. Product: Butyl Sealant manufactured by Tremco.
 2. Substitutions: See Section 01625 - Product Options and Substitutions.
 3. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
 - b. Under door thresholds.
- E. Type SJ-4 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.
1. Color: Standard colors matching finished surfaces.
 2. Product: ALEX PLUS Acrylic Latex Caulk Plus Silicone manufactured by DAP.
 3. Substitutions: See Section 01625 - Product Options and Substitutions.
 4. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- F. Type SJ-5 - Acoustical Sealant: Acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
1. Product: Acoustical Sealant manufactured by Tremco Inc.
 2. Substitutions: See Section 01625 - Product Options and Substitutions.
 3. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C 1193.
- C. Perform acoustical sealant application work in accordance with ASTM C 919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated steel doors and frames.
- B. Steel glazing frames.
- C. Accessories, including glazing and louvers.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.
- C. Acoustical qualities: Doors shall have a minimum sound transmission classification of 28 as tested under ASTM designation E413.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
 - 1. Doors shall be stored in an upright position under cover. Place the units on at least 4" wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. If the corrugated wrapper on the door becomes wet, or moisture appears, remove the wrapper immediately. Provide a 1/4" space between the doors to promote air circulation.
 - 2. Frames shall be stored under cover on 4" (101.6 mm) wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Assembled frames shall be stored in a vertical position, five units maximum in a stack. Provide a 1/4" (6.35 mm) space between frames to promote air circulation.

1.05 WARRANTY

- A. All doors and frames have a limited warranty to be free from defects in material and workmanship for a period of one year from the time of shipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:

1. Stiles Custom Metal; www.stilesdoors.com.
2. Door Components.Inc.; www.doorcomonentsinc.com.
3. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.
4. Republic Doors: www.republicdoor.com.
5. Steelcraft: www.steelcraft.com.
6. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:

1. Accessibility: Comply with ANSI/ICC A117.1.
2. Door Top Closures: Flush with top of faces and edges.
3. Door Edge Profile: Beveled on both edges.
4. Door Texture: Smooth faces.
5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
7. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
8. Finish: Factory primed, for field finishing.

- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Exterior Doors:

1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
2. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
3. Insulation: 1.5 lb density.
4. Weatherstripping: Separate, see Section 08710.

B. Interior Doors, Non-Fire-Rated:

1. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 1, full flush.

2. Core: Cardboard honeycomb.
3. Thickness: 1-3/4 inches.

2.04 STEEL FRAMES

A. General:

1. Frames shall be formed from 16 gage commercial quality carbon steel or galvanized steel.
2. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
3. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
4. Frames Installed Back-to-Back: Reinforce with steel channels anchored to floor and overhead structure.
5. Form frames as detailed in drawings.
6. Finish: Same as for door.

B. Exterior Door Frames: Fully welded.

1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
2. Weatherstripping: Separate, see Section 08710.

C. Interior Door Frames, Non-Fire-Rated: Knock-down type with architect's prior written approval.

1. Frames shall be formed with double return backbends to prevent cutting into the drywall surface.

D. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 ACCESSORY MATERIALS

A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.

1. Style: Standard straight slat blade.
2. Louver Free Area: 50 percent.
3. Fasteners: Concealed fasteners.

B. Glazing: As specified in Section 08800.

C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

D. Astragals for Double Doors: Specified in Section 08710.

E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

F. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.02 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. Coordinate frame anchor placement with wall construction.
- C. Coordinate installation of hardware.
- D. Coordinate installation of glazing.
- E. Touch up damaged factory finishes.

3.03 TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08310

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Access door and frame units, non-fire-rated, in wall locations.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of all access door units.
- D. Manufacturer's Installation Instructions: Indicate installation requirements.
- E. Provide locations for all access panels.
 - 1. Coordinate with other sub-contractors to confirm locations.
- F. Project Record Documents: Record actual locations of all access units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Access Doors:
- B. Basis of Design: Karp Associates, Inc: www.karpinc.com.
- C. Acceptable Manufacturer's:
 - 1. Acudor Products Inc: www.acudor.com.
 - 2. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
 - 3. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 ACCESS DOORS AND PANELS

- A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

2.03 ACCESS DOOR UNITS - WALL AND CEILINGS

- A. Door and Frame Units: Formed steel.
 - 1. Frames and flanges: 0.058 inch steel.
 - 2. Door panels: 0.070 inch single thickness steel sheet.
 - 3. Door panels: 14 gage single thickness steel sheet.
 - 4. Sizes: As shown on drawings. If not shown, then provide as listed below:
 - a. Walls: 12 x 12 inches minimum or as required for access.

- b. Ceilings: 12 x 12 inches minimum or as required for access.
 - 5. Hardware:
 - a. Hinge: 175 degree stainless steel piano hinge with removable pin.
 - b. Lock: Cylinder lock with latch, two keys for each unit.
 - 6. At wet locations, Galvanized, hot dipped finish.
 - 7. Prime coat with alkyd primer.
 - 8. Finish: See Section 09900 - Paints and Coatings.
- B. Non-Fire Rated Door and Frame Units in Walls:
- 1. In Gypsum Board on Steel Studs:
 - a. Model KDW manufactured by Karp Associates.
- C. Non-Fire Rated Door and Frame Units in Ceilings:
- 1. In Gypsum Board on Metal Furring:
 - a. Model KDW manufactured by Karp Associates.

2.04 FABRICATION

- A. Weld, fill, and grind joints to ensure flush and square unit.
- B. Provide gasketing for doors occurring in pressure-rated plenums and exterior walls

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08410

METAL-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Perimeter sealant.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Design Data: Provide framing member structural and physical characteristics, engineering calculations, dimensional limitations.
- E. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- F. Samples: Submit two samples 6 x 8 inches in size illustrating finished aluminum surface, glass, glazing materials.
- G. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- H. Report of field testing for water leakage.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.03 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at California.
- B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum three years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.05 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.06 WARRANTY

- A. See Section 01740 - Warranties and Guarantees, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide twenty year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Kawneer North America; Product 451 T: www.kawneer.com.
- B. Other Acceptable Manufacturers:
 - 1. United States Aluminum Corp; Product Series 451: www.usalum.com.
 - 2. Oldcastle Building Envelope, Product FG 3000T, www.oldcastlebe.com.
 - 3. Substitutions: See Section 01625 Product Options and Substitutions.

2.02 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: center.
 - 2. Vertical Mullion Dimensions: 2-1/4 x 4-1/2 inch.
 - 3. Water Leakage Test Pressure Differential: 8.0 lbf/sq ft.
 - 4. Air Infiltration Test Pressure Differential: 1.57 psf.
 - 5. Finish: Class I color anodized.
- B. Performance Requirements:
 - 1. Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of California Building code.
 - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
 - 2. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 - 3. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure across assembly in accordance with ASTM E 283.

4. Water Leakage: None, when measured in accordance with ASTM E 331 at specified pressure differential.
5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
6. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.
7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
- B. Doors (at Sector 6): Glazed aluminum.
 1. Thickness: 1-3/4 inches.
 2. Top Rail: 3-1/2 inches wide.
 3. Vertical Stiles: 3-1/2 inches wide.
 4. Bottom Rail: 10-1/4 inches wide.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.
 7. Basis of Design: Kawneer 350 medium stile entrance or approved equal.
- C. Doors (at Sector 5): Flush polyurethane filled, FRP clad door with vision glass.
 1. Thickness: 1-3/4 inches.
 2. Glazing Stops: Square.
 3. Finish: As selected by Architect from manufacturer's standard colors.
 4. Basis of Design: Kawneer Model AVL-4 Flushline Entrance or approved equal.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B 221 (ASTM B 221M).
- B. Sheet Aluminum: ASTM B 209 (ASTM B209M).
- C. Structural Steel Sections: ASTM A 36/A 36M; galvanized in accordance with requirements of ASTM A 123/A 123M.
- D. Fasteners: Stainless steel.
- E. Exposed Flashings: 0.032 inch thick aluminum sheet; finish to match framing members.
- F. Concealed Flashings: 0.018 inch thick galvanized steel.
- G. Perimeter Sealant: Type SJ-1 specified in Section 07900.
- H. Glass: As specified in Section 08800.

1. Glass in Sidelights and Interior Framing: Type GL1.
2. Glass in Walkway Framing: Type GL2.
- I. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- J. Glazing Accessories: As specified in Section 08800.
- K. Shop and Touch-Up Primer for Steel Components: SSPC-Paint 25, zinc oxide, alkyd, linseed oil primer.
- L. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.05 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.
 1. Color: Dark bronze to match existing storefront system.

2.06 HARDWARE

- A. Door Hardware: As specified in Section 08710.
- B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- C. Sill Sweep Strips: Resilient seal type, of neoprene; provide on all doors.
- D. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

2.07 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
- E. Arrange fasteners and attachments to conceal from view.
- F. Reinforce components internally for door hardware and door operators.
- G. Reinforce framing members for imposed loads.
- H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
 1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- J. Set thresholds in bed of mastic and secure.
- K. Install glass in accordance with Section 08800, using exterior wet/dry glazing method.
- L. Install perimeter sealant in accordance with Section 07900.
- M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

- A. Adjust operating hardware for smooth operation.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION

- A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Furnish door hardware in accordance with hardware group as indicated.
 - 2. Furnish templates and hardware list of hardware as required.
 - 3. Furnish cylinder for entrance doors, coiling doors, electrical panels and fire alarm panels.
- B. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.
- C. Related Sections:
 - 1. Section 08 11 00 – Steel Doors and Frames: Installation of finish hardware accordance with standards of this Section.
 - 2. Section 08 41 00 – Glazed Aluminum Curtainwalls: Installation of weather seals for entrances in accordance with standards of this Section.

1.02 REFERENCES

- A. ADA - Americans with Disabilities Act
- B. CBC – California Building Code, 2007 Edition
- C. DHI - Door and Hardware Institute.
 - 1. RL – Recommended Locations for Builders Hardware for Standard Steel Doors and Frames.
- D. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Windows
- E. NWWDA – National Wood Window and Door Association
 - 1. I.S.1.7 – Hardware Location for Wood Flush Doors.
- F. UL - Underwriters Laboratories, Inc.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each item of door hardware installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 1. Final hardware schedule, incorporating the Architect's door numbering system coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
- B. Samples: Submit samples of each type of exposed hardware unit in finish indicated and tagged with full description of coordination with schedule. Submit samples prior to submission of final hardware schedule.
 - 1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final

check of operation, be incorporated in the Work, within limitation of keying coordination requirements.

- C. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. Fire Rated Openings: Provide door hardware for fire rated openings that complies with NFPA 890 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL or Intertek Testing Services.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping

- 1. Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate contents and specific location on the Work.
- 2. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in the same container.
 - a. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

- B. Acceptance at Site: Deliver individually packaged door hardware items promptly to place of installation (Sop or Project site).

- C. Storage and protection: Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.06 MAINTENANCE

- A. Maintenance Tools and Instructions: With delivery of keys, furnish a complete set of specialized tools and maintenance instructions as needed for the District's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.01 GENERAL

A. Fasteners

- 1. Furnish necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
- 2. Where necessary, furnish fasteners with toggle bolts, expansion shields, sex bolts, and other anchors approved by the architect, according to the material to which the hardware is to be applied and according to the recommendations, of the hardware manufacturer.
- 3. Provide fasteners which harmonize with the hardware as to finish and material.

- B. Where butts are required to swing 180 degrees, furnish butts of sufficient throw to clear the trim.
- C. Furnish silencers for door frames at the rate of 3 for each single door and 2 for each door or pair of doors; except weather-stripped doors and doors with light seals, smoke seals or sound seals.

2.02 KEYING

- A. Factory key, masterkey, and grand-masterkey locks and cylinders as directed by the District. Corbin Russwin N-23 Keyway is Campus Standard.
- B. Furnish 3 keys for each lock, 12 masterkeys for each set, and 3 grand-masterkeys.
- C. Construction Keying
 - 1. Furnish a construction masterkey system with 5 keys for locks and cylinders. No more than 6 for any group. The rest in blanks.
 - 2. Use only the construction keys during construction.
 - 3. Upon Substantial Completion of the work, as that Date is established by the Architect, Campus Facilities personnel will void construction key system.
- D. Identification and Delivery
 - 1. Factory stamp permanent keys, "DO NOT DUPLICATE".
 - 2. Send direct to the District by direct delivery the IC cores and keys specified. Order hardware-less cores for faster delivery.

2.03 HINGES

- A. General
 - 1. provide hinges having minimum of 5 knuckles.
 - 2. provide ball-bearing hinges having concealed bearings and interior self-lubricating bushings.
 - 3. Provide ball bearing hinges on doors with closers.
 - 4. Provide fire-resistance doors with steel hinges.
 - 5. Provide interior doors with non-rising hinges.
 - 6. Provide exterior out-swing doors with non-removable pins.
 - 7. Provide template hinges conforming to ANSI A156.7.
 - 8. Size: In accordance with the following table unless specifically noted otherwise:
 - a. Butt Height
 - 1) Doors 1-3/8 Inches Thick: 3-1/2 inches.
 - 2) Doors 1-3/4 Inches Thick and Up to 41 Inches wide: 4-1/2 inches.
 - 3) Doors 1-3/4 Inches and from 41 inches to 48 inches wide: 4-1/2 inches extra heavy.
 - 4) Doors 2 Inches Thick of Over 48 Inches Wide: 5 inches extra heavy.
 - b. Butt Widths: Sufficient to clear trim projection when door swings 180 degrees.
 - c. Number Per Door Leaf Unless Otherwise Noted:
 - 1) Door to 60 inches high: 2 hinges.
 - 2) Door to 90 inches high: 3 hinges.
 - 3) door to 120 inches high: 4 hinges.
- B. Material
 - 1. Exterior: Stainless steel, ball-bearing.
 - 2. Interior: Steel, ball-bearing.
 - 3. Manufacturer: Ives (IVE), Hager Hinge, Stanley or McKinney.

2.04 LOCKSETS, LATCHSETS AND HANDLESETS

A. General

1. Cylinders
 - a. Minimum 6 pin interchangeable core cylinders with steel cylindrical cases, and all interior parts shall be non-ferrous. Do not supply plastic, die-cast or aluminum mechanisms.
 - b. Provide in keyway as specified. Corbin Russwin N-23 keyway is Campus Standard.
 - c. Furnish with plugs of extruded brass bar material full round without flattened areas.
2. Locksets: Provide lockset types specified from the same manufacturer and capable of receiving cylinders complying with requirements specified in "Cylinders" paragraph above.
3. Heavy Duty Cylindrical Locksets
 - a. Product: Corbin-Russwin (C-R), "CL3300 Series" of "NZD" design.
4. Backset: 3-3/4 inches, unless otherwise noted.
5. Strikes
 - a. Type: Standard type with extended lips where required to protect trim from marring by latch bolt. Verify cutout types provided in metal frames. Locks shall have stainless steel, 3/4-inch throw.
 - b. Material: Same as lock trim.
6. Quantity: Provide 1 lockset assembly for each door opening in accordance with the Schedule, unless other noted. Install lockset on active leaf or pair of doors. Pairs of doors scheduled to receive roller latches shall have one for each leaf.
7. Provide matching door handle on left leaf where needed.

2.05 CLOSERS

A. General

1. Provide closers having maximum effort to operate in accordance with CBC Sections 1133B.2.1, 1133B.2.5, 1133B2.5.1 & 1008.1 and ADA as follows:
 - a. Exterior Hinges Doors: 5 pounds.
 - b. Interior Hinges Doors: 5 pounds.
 - c. Fire Doors: The Authority having jurisdiction may increase the maximum effort to operate fire doors to achieve positive latching, but not to exceed 15 pounds.
2. Adjust closers in accordance with manufacturer's directions for size of door.
3. Provide closers having"
 - a. Full rack and pinion with steel spring and non-gumming, non-freezing hydraulic fluid.
 - b. Provide complete set of separate controls for regulating sweep speed, latch speed, and backcheck. Sizes as recommended by reviewed manufacturer.
 - c. A sweep period, adjusted so that, from an open position of 70-degrees, the door shall take at least 3 seconds to move to a point 3-inches from the latch measured to the leading edge of the door.

B. Door Surface Applied Modern Closers:

1. Provide closers with molded plastic covers capable of receiving finishes as specified in Article titled "Finishes" in this Section.
2. Provide drop plates at doors having narrow frames.
3. Product: LCN (LCN), or Norton.

C. Quantity: Provide each leaf in pairs of doors schedule to receive closers.

D. Overhead and Floor Concealed Closers:

1. Provide concealed closes with fully-adjustable spring power, non-gumming, non-freezing hydraulic fluid and delayed action closing, where specified.
2. Furnish pivots sets from same manufacturer as concealed closers.
3. Provide spindle height to suit installation requirements.
4. Product: Rixson (RIX), Division of Assa-Abloy.

2.06 EXIT DEVICES

- A. Exit devices: Von Duprin (VON) as scheduled with push-through pad design, no exposed touch bar fasteners, no exposed cavities when operated.
1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2007 standards.
 2. Compression spring engineering.
 3. Non-handed basic device design with center case interchangeable with all functions.
 4. All devices shall have quiet return fluid dampeners.
 5. All latchbolts shall be deadlocking with $\frac{3}{4}$ " throw and have a self-lubricating coating to reduce friction and wear.
 6. Device push bar must release when a force of 32 pounds, or less, of pressure is applied when a force of 250 pounds is applied to the door.
 7. Device shall bear UL label for fire and or panic as may be required.
 8. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
 9. Panic Hardware shall comply with CBC 1008.1.8.2 and shall be mounted between 30" and 44" above the finished floor surface. The unlatching force shall not exceed 15 lbs. applied in the direction of travel. Panic hardware shall comply with CBC Section 1008.1.9.

2.07 STOPS AND HOLDERS

- A. General
1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Do not install floor stops more than four (4) inches from the face of the wall or partition (Title 24, 1133B.8.6).
 3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
 4. Manufacturer: Ives (IVE), Trimco, or Builders Brass.

2.08 AUTO BOLTS

- A. General
1. Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
 2. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
 3. Provide dust proof strikes at openings using bottom bolts.
 4. Manufacturer: Ives (IVE), Trimco or Builders Brass.

2.09 DOOR PROTECTION PLATES

- A. General
1. Kick Plates
 - a. Width and Anchorage: Provide plates 2 inches narrower than single doors or 1 inch narrower than pair of doors. Ensure anchorage to bottom rail
 - b. Height: Minimum 10 inches.

- c. Thickness: Stainless steel, 0.050-inches thick, with beveled edges 3 sides.
- d. Quantity: Provide kick plates on push side of doors unless scheduled differently.
2. Manufacturer: Ives (IVE), Trimco or Builders Brass.

2.10 THRESHOLDS

- A. General
 1. Provide thresholds that comply with the disability requirements of the ADA.
 2. Set thresholds solidly to floor.
 3. Provide thresholds notched at frame stops and entire with of frame.
 4. Material: Extruded aluminum, unless otherwise noted.
 5. Manufacturer: National Guard Products (NGP), or Pemko.
 6. Thresholds shall comply with CBC Section 1133B.2.4.1.
 7. See threshold details for model numbers.

2.11 WEATHER-STRIPPING / SEAL

- A. General
 1. Fire and Smoke
 2. Manufacturer: National Guard Products (NGP), or Pemko.
 - a. Material: Self-adhesive silicon seal, rated for fire and smoke in accordance with ASTM E283, sound rated in accordance with ASTM E90.
 - b. Extent: Seal sets shall consist of gasketing that is continuous at head and jambs.
 3. Sound and Thermal Seals
 - a. Material: Aluminum unless otherwise noted, with adjustable extruded EPDM closed cell sponge neoprene and fire labeled in accordance with ASTM E152, UL 10C and CBC.
 - b. Extent: Sound seal sets shall consist of Gasketing that is continuous at head and jambs.

2.12 MISCELLANEOUS

- A. Miscellaneous items include, dust proof strikes, coordinators, and exit alarms and alarm contact switches, power supplies.
 1. Manufacturer: See Schedule.

2.13 KEY CONTROL SYSTEM

- A. General
 1. Provide system including envelopes, labels, tags with self-locking key clips, receipt forms, thee-way visible card index, temporary markers, permanent markers, and standard metal cabinet, as recommended by system manufacturer, with capacity for 150 percent of the number of locks require for the Project.
 2. Provide complete cross index system set up key control manufacturer and place keys on markers and hooks in the cabinet as determined by the final key schedule.
 3. Provide hinged-panel type cabinet for wall mounting.
 4. Provide "simplex" type push button lock on cabinet. Furnish Telkee (TEL) "AWC450S-SMTC" or equal.

2.14 SILENCERS

- A. General
 1. Material: Pneumatic rubber, installed in metal frame stops.
 2. Quantity: Furnish 3 for single doors and 2 for each door for pairs of doors.
 3. Manufacturer: Ives (IVE), Trimco or equal.

2.15 FINISH

- A. Generally to be satin stainless US32D (BHMA 630) unless otherwise noted.
- B. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
- C. Aluminum items to be finished anodized aluminum US28 (628), except thresholds which can be furnished as standard mill finish.

2.16 KEY BOX

- A. Contact jurisdictional fire department and obtain order forms necessary to order Knox Company, 3200 Series Knox Box, recessed mount with hinged door.
 - 1. Box and lockare to be UL listed.
 - 2. Color: Aluminum.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and door frames for damage or defects and examine hardware for compatibility with receiving conditions and suitability to intended use.
- B. Verify that required wall backing has been installed.
- C. Do not install hardware until unsuitable conditions have been corrected or inadequate or defective items have been replaced.

3.02 PREPARATION

- A. Coordinate with work requiring hardware or work to which hardware attaches.
- B. Provide necessary copies of schedules or templates in ample time to avoid fabrication and construction delays.
- C. Provide key control system installer with 1 reviewed copy of hardware schedule and keying instructions.

3.03 INSTALLATION

- A. Mount hardware units at heights indicated in DHI RL and NWWDA I.S.1.7, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by the Architect. Mount floor stops maximum 4" from wall.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in Section 09900. Do not install surface mounted items until finishes have been completed on the substrates involved.

- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standard.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Section 07900.
- F. Weather-stripping and Seals:
 - 1. Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.
 - 2. Provide door shoe or other bottom door seal / weatherstripping at all exterior and stairwell doors.

3.04 ADJUSTING, CLEANING AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made. Doors must be adjusted to ADA requirements at punch list completion.
- B. Clean adjacent surface soiled by hardware installation.
- C. Instruct the District's Personnel in proper adjustment and maintenance of hardware finishes.

Manufacturers Abbreviations (Mfr.)

*C-R	=	Corbin-Russwin	Locksets, Latchsets & Cylinders
GLY	=	Glynn-Johnson Corporation	Overhead Door Stops
IVE	=	Ives	Hinges, Bolts, Coordinators, Dust Proof Strikes, Kick Plates, Door Stops & Silencers
KNX	=	Knox Box	Knox Box Key Cabinets
*LCN	=	LCN	Door Closers & Auto Operators
NGP	=	National Guard Products	Thresholds, Gasketing & Weather-stripping
SCE	=	Schlage Electronics	Power Supply
*VON	=	Von Duprin	Exit Devices, Power Transfers & Power Supplies

* Items indicated with asterisk are Campus Standard – NO SUBSTITUTIONS.

SPECWORKS # 110232

HARDWARE GROUP: 01

3	Ea	Hinge	5BB1 4.5 X 4.5 NRP	652	IVE
1	Ea	Entrance Lock	CL3351 NZD M17 CT6	626	C-R
1	Ea	Std Ic Core	8000-6	626	C-R
1	Ea	Wall Stop	WS407CCV	630	IVE
1	Set	Seals	5050B	BRN	NGP

HARDWARE GROUP: 02

1	Ea	Continuous Hinge	224HD	313	IVE
1	Ea	Entrance Lock	CL3351 NZD M17 CT6	613	C-R
1	Ea	Std Ic Core	8000-6	613	C-R
1	Ea	Surface Closer	4111 SCUSH	695	LCN
1	Ea	Door Sweep	200NDKB	313	NGP
1	Ea	Threshold	Per Detail	AL	NGP

WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

HARDWARE GROUP: 03

3	Ea	Hinge	5BB1 4.5 X 4.5 NRP	652	IVE
1	Ea	Entrance Lock	CL3351 NZD M17 CT6	626	C-R
1	Ea	Std Ic Core	8000-6	626	C-R
1	Ea	Electric Strike	6211 FSE 24VDC	630	VON
1	Ea	Auto Operator	9542 REG	628	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Wall Stop	WS407CCV	630	IVE
1	Set	Seals	5050B	BRN	NGP
1	Ea	Mortise Cylinder	1080-CT6 X CYLINDER COLLAR (KEY SWITCH)	626	C-R
1	Ea	Key Switch	653	630	SCE
4	Ea	Actuator, Wall Mount	8310-853		LCN
4	Ea	Surface Mount Box	8310-867S		LCN

KEY SWITCH ACTIVATES / DE-ACTIVATES ACTUATORS FOR AFTER HOURS NON-OPERATION

HARDWARE GROUP: 04

3	Ea	Hinge	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	Ea	Classroom Lock	CL3355 NZD M17 CT6	626	C-R
1	Ea	Std Ic Core	8000-6	626	C-R
1	Ea	Surface Closer	4011	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Dome Stop	FS436/8	626	IVE
1	Set	Seals	5050B	BRN	NGP

HARDWARE GROUP: 05

1	Ea	Continuous Hinge	224HD	628	IVE
1	Ea	Panic Hardware	98L 996L-17	626	VON
1	Ea	Rim Cylinder	3080-CT6 X 422F88 COLLAR	626	C-R
1	Ea	Std Ic Core	8000-6	626	C-R
1	Ea	Surface Closer	4111 AVB	689	LCN
1	Ea	Floor Stop	FS441	626	IVE

END OF SECTION

SECTION 08800

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass.
- B. Glazing compounds and accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.03 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Samples: Submit two samples 12 x 12 inch in size of glass units.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01625 - Product Options and Substitutions, for additional provisions.
 - 2. Extra Insulating Glass Units: One of each glass size and each glass type.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.
- C. Safety glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- D. Insulating glass certification program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency.
 - 1. Insulating Glass Certification Council.
 - 2. Associated Laboratories, Inc.
 - 3. National Accreditation and Management Institute.

E. Labeling:

1. Submit a certificate stating that the glass furnished for the Project complies with the Specifications.
2. Label each piece of heat-treated glass with a permanent logo etched in one corner to identify the fabricator.

1.05 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.06 WARRANTY

- A. See Section 01740 - Warranties and Guarantees, for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 GENERAL:

- A. Glass to comply with ASTM C 1048.
- B. Clear Glass Quality: Ultra Clear (Low Iron) ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
- C. Comply with ASTM C 1172 Standard Specification for Laminated Architectural Flat Glass.
- D. ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
- E. ANSI Z97.1 American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications Method of Test.
- F. US Consumer Product Safety Commission CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials
- G. Glass shall be free from bubbles, smoke vanes, air holes, scratches and other defects.
- H. Fabricate tempered glass by horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
- I. Comply with Code and the Drawings for glass in hazardous locations. Laminated glass subject to human impact shall comply with CPSC 16 CFR Part 1201.

2.02 GLAZING TYPES

- A. Type GL1 - Single Vision Glazing:
 1. Applications: Sidelights and interior storefronts.
 2. Type: Annealed float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch.

5. Fully tempered float where required by code.
 6. Glazing Method: Gasket glazing.
- B. Type GL2 - Single Vision Glazing:
1. Applications: Walkway storefronts.
 2. Type: Annealed float glass.
 3. Tint: Bronze, to match existing glass.
 - a. Visual Light Transmittance: 50 percent, nominal.
 4. Thickness: 1/4 inch.
 5. Fully tempered float where required by code.
 6. Glazing Method: Gasket glazing.

2.03 GLASS MATERIALS

- A. Float Glass: All glazing is to be float glass unless otherwise indicated.
1. Annealed Type: ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 2. Heat-Strengthened and Fully Tempered Types: ASTM C 1048.
 3. Tinted Types: Color and performance characteristics as indicated.
 4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

2.04 GLAZING COMPOUNDS

- A. Silicone Sealant (Type SJ-2): Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; cured Shore A hardness of 15 to 25; color as selected.

2.05 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; size; black color.
1. Manufacturers:
 - a. Pecora Corporation: www.pecora.com.
 - b. Tremco Global Sealants: www.tremcosealants.com.
 - c. Substitutions: Refer to Section 01600 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

- A. Prime surfaces scheduled to receive sealant.
- B. Install sealants in accordance with ASTM C 1193 and FGMA Sealant Manual.
- C. Install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with SJ-2 sealant.
- B. Apply heel bead of SJ-2 sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.
- F. Fill gap between glazing and stop with SJ-2 type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
- G. Apply cap bead of SJ-2 type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.04 INSTALLATION - EXTERIOR WET METHOD (SEALANT AND SEALANT)

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- C. Fill gaps between glazing and stops with SJ-2 type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

- A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

- D. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.
- E. Fill gaps between pane and applied stop with SJ-2 type sealant to depth equal to bite on glazing, to uniform and level line.
- F. Trim protruding tape edge.

3.06 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.07 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Test Reports: For all stud framing products that do not comply with ASTM C 645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.03 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C 840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions Indicated as Sound-Rated: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
1. Clark Western Building Systems: www.clarkwestern.com.
 2. Dietrich Metal Framing: www.dietrichindustries.com.
 3. MarinoWare: www.marinoware.com.
 4. Substitutions: See Section 01625 - Product Options and Substitutions.
- B. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
1. Studs: "C" shaped with flat or formed webs.
 2. Runners: U shaped, sized to match studs.
 3. Ceiling Channels: C shaped.
 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05400.
- D. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
1. Retain one of four furring channel subparagraphs or associated subparagraphs below or, if more than one is required, indicate locations of each on Drawings.
 2. Cold Rolled Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flange, 3/4 inch (19.1 mm) deep.
 3. Steel Studs: ASTM C 645.
 - a. Minimum Base Metal Thickness: As indicated, if not indicated then .0179 inch.
 - b. Depth: As indicated, if not indicated then 1-5/8 inches.
 4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
 - a. Minimum Base Metal Thickness: As indicated, if not indicated then 0.0179 inch.
 5. Retain above for nonproprietary or below for semi proprietary Specification. Refer to Division 1 Section "Product Requirements."
- E. Products: Subject to compliance with requirements, provide one of the following:
1. Armstrong World Industries, Inc.; Furring Systems/Drywall.
 2. Chicago Metallic Corporation; Drywall Furring 640 Drywall Furring 660 System.
 3. USG Interiors, Inc.; Drywall Suspension System.
- F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 2. Material: ASTM A 653/A 653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.

3. Deflection Track:
 - a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
 - b. Acceptable Products:
 - 1) "Posi Clip" by Fire Trak Corporation.
 - 2) "The System" by Metal-Lite, Inc.
4. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

2.03 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Gypsum board to be type X rated. Attachment may be in accordance with non-rated requirements.
 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
 4. Paper-Faced Products:
 - a. American Gypsum; FireBloc Type X Gypsum Wallboard.
 - b. CertainTeed Corporation; ProRoc Brand, Type X Gypsum Board.
 - c. Georgia-Pacific Gypsum LLC; ToughRock, Type X Gypsum Wallboard.
 - d. Lafarge North America Inc; Firecheck Type X and Type C.
 - e. National Gypsum Company; Gold Bond Brand Type X Gypsum Wallboard.
 - f. Pacific Coast Building Products, Inc; PABCO Flame Curb.
 - g. Temple-Inland Inc; Gypsum Board Fire Resistant Panels Type X and Type TGC.
 - h. USG Corporation; Sheetrock Brand Gypsum Panels with Firecore core.
 - i. Substitutions: See Section 01625 Product Options and Substitutions.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced.
 1. Type: Thermafiber Sound Attenuation Fire Blanket (SAFB).
 - a. Thickness: Provide 4 inch thick batts in 4 inch stud walls and use 6 inch thick batts in 6 inch stud walls.
 - b. R-Value: 3.7 per inch.
 - c. Density: 2.5 pcf (nominal).
- B. Acoustic Sealant: As specified in Section 07900.

- C. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Manufacturers - Finishing Accessories:
 - a. Same manufacturer as framing materials.
 - b. Phillips Manufacturing Co: www.phillipsmfg.com.
 - c. Stockton Products, www.stocktonproducts.com..
 - d. Substitutions: Section 01625 Product Options and Substitutions.
 - 3. Types: As detailed or required for finished appearance.
 - a. Shapes are as shown in drawings and includes the following:
 - 1) Corner Key
 - 2) Corner Trim
 - 3) J-Mold
 - 4) L-Trim
- D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 - 2. Ready-mixed vinyl-based joint compound.
 - or
 - 3. Powder-type vinyl-based joint compound.
- E. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- F. Textured Finish Materials: Latex-based compound; plain.
- G. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, and to Gypsum Board: ASTM C 1002; self-piercing tapping type hot-dipped galvanized.
- H. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.
- I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C 754 and manufacturer's instructions.

- B. Studs: Space studs as shown on drawings, if not shown, then as permitted by standard.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- D. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 1. Orientation: Horizontal.
 - 2. Spacing: As indicated.
- E. Blocking: Install mechanically fastened steel sheet blocking for support of:
 - 1. Framed openings.
 - 2. Wall mounted cabinets.
 - 3. Plumbing fixtures.
 - 4. Toilet partitions.
 - 5. Toilet accessories.
 - 6. Wall mounted door hardware.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.05 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use fiberglass joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C 840, as follows:
 - 1. Level 5: Not Used.
 - 2. Level 4: Walls and ceilings to receive texture finish, paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 3: Walls in Utility areas.
 - 4. Level 2: Behind cabinetry, and on backing board to receive tile finish.
 - 5. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.06 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions to comply with Campus Standard "Light Orange Peel".

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09511

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Glue-on acoustical ceiling tiles at ceiling in Office of Instruction as required to replace existing damaged tiles.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.03 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components.
- D. Samples: Submit two samples 4 by 4 inch in size illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 12 inches long, of suspension system main runner.
- F. Manufacturer's Installation Instructions: Indicate special procedures.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01625 - Product Options and Substitutions, for additional provisions.
 - 2. Extra Acoustical Units: one sealed carton of each type and size.

1.04 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
 - a. Flame Spread: 25 or less
 - b. Smoke Developed: 50 or less

- B. Seismic Performance: Provide acoustical ceiling system that has been evaluated by an independent party and found to be compliant with the 2010 California Building Code, Seismic Category as appropriate.
 - 1. Tested per International Code Council - Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components as evidenced by International Code Council Evaluation Report, ESR-1308.
- C. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.06 PROJECT CONDITIONS

- A. Space Enclosure: Standard Ceilings: Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.

1.07 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.08 WARRANTY

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
 - 1. Acoustical Panels: Sagging and warping
 - 2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
 - 1. Acoustical panels: One (1) year from date of substantial completion.
 - 2. Cirrus Acoustical panels: Ten (10) years from data of substantial completion. Note Space Enclosure requirements.
 - 3. Grid: Ten years from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Manufacturers:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. Acceptable Manufacturers;
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. USG: www.usg.com.
 - 3. Substitutions: See Section 01625 - Product Options and Substitutions.
- B. Acoustical Units - General: ASTM E 1264, Class A.
- C. Acoustical Panels Type AC-1: Painted mineral fiber, ASTM E 1264, Type III, Form 1, Pattern E 1 with the following characteristics:
 - 1. Size: 24 x 48 inches.
 - 2. Thickness: 3/4 inches.
 - 3. Light Reflectance: 86 percent, determined as specified in ASTM E 1264.
 - 4. NRC Range: .70, determined as specified in ASTM E 1264.
 - 5. Ceiling Attenuation Class (CAC): 35, determined as specified in ASTM E 1264.
 - 6. Edge: Square.
 - 7. Surface Color: White.
 - 8. Product: Cirrus #533HRC by Armstrong World Industries.
 - 9. Suspension System: Exposed grid Type 1.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 - 1. Same as for acoustical units.
 - 2. Substitutions: See Section 01625 - Product Options and Substitutions.
- B. System Description:
 - 1. Seismic Loads: Design and size components to withstand seismic loads in accordance with ASCE 7-05, Chapter 13 as specified by the International Building Code, Chapter 16. Specific seismic requirements for suspended ceiling are located in ASCE section 13.5.6
- C. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- D. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.
 - 4. Product: Prelude XL HRC by Armstrong World Industries.

2.03 ACCESSORIES

- A. Attachment Devices: In accordance with the ASCE 7-05, Chapter 13 as specified by the International Building Code, Chapter 16. Specific seismic requirements for suspended ceiling are located in ASCE section 13.5.6, for Category D, E, and F.
- B. Wire for Hangers and Ties: In accordance with the ASCE 7-05, Chapter 13 as specified by the International Building Code, Chapter 16. Specific seismic requirements for suspended ceiling are located in ASCE section 13.5.6.
- C. Perimeter Moldings: Same material and finish as grid.
 - 1. At exposed grid: nominal 15/16 inch x 15/16 inch hemmed, pre-finished angle molding (7809).
- D. Provide BERC2 - 2 inch Beam End Retaining Clip, 0.034 inch thick, hot-dipped galvanized cold-rolled steel per ASTM A568 - used to join main beam or cross tee to wall molding.
- E. Provide SJCG - Seismic Joint Clip, 5 inches x 1-1/2 inch, hot-dipped galvanized cold-rolled steel per ASTM A568. The two piece unit is designed to accommodate a seismic separation joint. The clip is compatible with 15/16 inch and 9/16 inch grid systems including Prelude, Suprafine, and Silhouette. The SJCG is not suitable for use with Vector panel installations.
- F. Provide SJMR15 - Seismic Joint Clip - Main Beam, 1 inch x 4 inches, commercial quality cold rolled hot dipped galvanized steel per ASM A568, chemical cleansed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.
- C. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

- A. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
 - 1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system and panels in accordance with the ASCE 7-05, Chapter 13 as specified by the International Building Code, Chapter 16. Specific seismic requirements for suspended ceiling are located in ASCE section 13.5.6., except as noted in Section 4.4.3.1 of ESR-1308, and with the authorities having jurisdiction.
- B. ESR-1308, Section 4.4.3.1, Alternate Seismic Design Category D,E and F Installation:
 - 1. Under this installation, the runners must be rated heavy-duty and have a minimum simple span uniform load of 16.35 pounds per lineal foot (238 N/m); maximum ceiling weight permitted is 4.0 pounds per square foot (19.5 kg/m²).

2. The BERC-2 clip is used to secure the main runners and cross runners on two adjacent walls to the structure and the two opposite walls to the perimeter trim, as detailed below. A nominal 7/8-inch (22 mm) wall molding is used in lieu of the 2-inch (51 mm) perimeter supporting closure angle required by Section 9.6.2.6.2.2 (b) of ASCE-7 for Seismic Design Categories D, E and F. Except for the use of the BERC-2 clip and the 7/8-inch (22 mm) wall molding and elimination of spreader bars, installation of the ceiling system must be as prescribed by the applicable code.
 3. The BERC-2 clip is attached to the wall molding by sliding the locking lances over the hem of the vertical leg of the wall molding. Clips installed on the walls where the runners are fixed are attached to the runner by a sheet metal screw through the horizontal slot in the clip into the web of the runner.
 - a. Alternate #2: If acceptable to architect, fixed attachment may be accomplished by pop-riveting the runner to the wall molding.
 4. Clips installed on the walls where the runners are not fixed to the runner allow the terminal runner end to move 3/4 inch (19.1 mm) in both directions. BERC-2 clips installed in this manner are an acceptable means of preventing runners from spreading in lieu of spacer bars required in CISCA 3-4, which is referenced in ASCE 7, Section 9.6.2.6.2.2, which is referenced in ASCE 7-05, Chapter 13 as specified by the International Building Code, Chapter 16. Specific seismic requirements for suspended ceiling are located in ASCE section 13.5.6.
- C. The SJCG Seismic Separation Joint Clip is to be installed per the manufacturer's instructions, CS-3815.
- D. The SJMR15 Seismic Joint Clip Main Beam is to be installed per the manufacturer's instructions, CS-3955.
- E. The presence of a hanger wire within 3 inches of an expansion relief joint as called for in ASTM C636 shall be required in addition to the requirements of the ASCE 7-05, Chapter 13 as specified by the International Building Code, Chapter 16. Specific seismic requirements for suspended ceiling are located in ASCE section 13.5.6 and with the authorities having jurisdiction.
 1. Only applies when using Prelude XL Fire Guard 15/16"; Prelude Plus XL Fire Guard 15/16"; and Suprafine XL Fire Guard 9/16" Exposed Tee Systems.
- F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
- G. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this section.
- H. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- I. Locate system on room axis according to reflected plan.
- J. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- K. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- L. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

- M. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- N. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- O. Do not eccentrically load system or induce rotation of runners.
- P. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners.

3.04 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.

3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09685

CARPET TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.
- B. Resilient base.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Submit two, 12 inch long samples of edge strip.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet with minimum three years experience.

PART 2 PRODUCTS

2.01 CARPET TILE MANUFACTURERS

- A. Lees Carpet.
- B. Substitutions: Not permitted.

2.02 MATERIALS

- A. Carpet Tile Type CA-1: Tufted, manufactured in one color dye lot.
 - 1. Product: Faculty IV Modular manufactured by Lees Carpet.
 - 2. General Requirements:
 - a. Style Number: DK163
 - b. Product Construction: Tufted.

3. Product Specifications:
 - a. Surface Texture - performance loop pile
 - b. Gauge - 1/8 (31.50 rows per 10 cm).
 - c. Density - 6,455.
 - d. Weight Density - 167,830.
 - e. Stitches Per Inch - 8.3 per inch.
 - f. Finished Pile Thickness - .145" avg.
 - g. Dye Method - yarn dyed.
 - h. Backing Material - ICT-RC - Fiberglass Reinforced Thermoplastic Composite Tile.
 - i. Face Yarn - Antron® Legacy nylon 6,6 with DuraTech Soil Protection by DuPont.
 - j. Face Weight - 26 oz/yd².
 - k. Installation Method - monolithic, quarter turn.
 - l. Tile Size: 24 x 24 inch, nominal.
4. Performance Requirements:
 - a. Radiant Panel: (ASTM E-648) Class 1.
 - b. Smoke Density: (ASTM E - 662) Less than 450 flaming mode.
 - c. Static: 3.0 kv when tested under the Standard Shuffle Test 70 degrees Fahrenheit - 20% R.H.
 - d. Flammability - Passes DOC-FF-1-70 Pill Test
 - e. Construction Materials: 100% man-made materials for superior stability. Specifications are subject to change without notice when such changes do not alter product performance. Slight color variation may occur from dye lot to dye lot.
5. Color: As indicated on Finish Schedule.

2.03 RESILIENT BASE

- A. Resilient Base: ASTM F 1861, Type TS rubber, vulcanized thermoset; top set Style A, Straight, and as follows:
 1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 2. Height: 4 inch.
 3. Thickness: 0.125 inch thick.
 4. Finish: Satin.
 5. Length: Roll.
 6. Color: #660 Rocky.
 7. Accessories: Premolded external corners and end stops.
 8. Manufacturers:
 - a. Basis of Design: BurkeMercer Flooring Products; Product TS Rubber Base: www.burkemercer.com.
 - b. Johnsonite, Inc: www.johnsonite.com.

- c. Roppe Corp: www.roppe.com.
- d. Substitutions: See Section 01600 - Product Requirements.

2.04 CARPET ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge/Transition Strips: Rubber, color to match rubber base
- C. Edge Strips: Embossed aluminum, clear color.
- D. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.
 - 1. Product: Grid-Set Green Glue 2000 manufactured by InterfaceFlor or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions and CRI Carpet Installation Standard.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09850

ACOUSTICAL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabric-covered custom fiberglass core panels and mounting accessories.
- B. Fabric-covered custom fiberglass core ceiling baffles.

1.02 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.
- D. Verification Samples: Fabricated samples of each type of panel specified; 12 x 12 in, showing construction, edge details, and fabric covering.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Panels: Quantity equal to 5 percent of total installed, but not less than three of each type.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company with not less than 5 years of experience in manufacturing acoustical products similar to those specified.
- B. Provide all acoustical panels by one manufacturer.
- C. Flammability and toxicity: Provide materials complying with Code for flammability and toxicity and the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame spread: 25 or less.
 - 2. Smoke developed: 450 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect acoustical panels from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until panels are needed for installation.
- B. Store panels flat, in dry, well-ventilated space; do not stand panels on end.
- C. Protect panel edges from damage.

1.05 MOCK-UP

- A. See Section 01400 - Quality Control Requirements, for additional mock-up requirements.
- B. Construct mock-up of acoustical panels at location indicated by Architect.
 - 1. Minimum mock-up dimensions: 96 x 96 inches minimum.
 - 2. Approved mock-up may remain as part of the Work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustical Panels:

1. Basis of Design: NOISE S.T.O.P. FABRISORB Decorative Acoustical Wall Panels and Ceiling Clouds S.T.O.P.: www.AcousticalSurfaces.com.
2. Acceptable manufacturers:
 - a. Essi Acoustical Products Company: www.essiacoustical.com.
3. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 ACOUSTICAL WALL PANELS AND CEILING BAFFLES

A. Panels: Prefinished, factory assembled fabric-covered panels.

1. Surface Burning Characteristics: Flame spread index of 15 or less and smoke developed index of 40 or less, when tested in accordance with ASTM E 84.
2. Product shall have a Class A rating per ASTM E 84.

B. Fiberglass Core Wall and Ceiling Panels:

1. Density: 6-7 lb/cu ft.
2. Style:
 - a. Absorptive unless noted otherwise.
 - b. Hi-Tack for tackable acoustic wall panels where indicated on drawings.
3. Surface Burning Characteristics: Flame spread/Smoke developed index of 15/40, maximum, when tested in accordance with ASTM E 84.
 - a. Class A
4. Panel Width: Custom size, as detailed.
5. Panel Height: Custom size, as detailed.
6. Baffles sizes as shown on Reflected Ceiling Plan.
7. Panel Thickness: 1 inch.
8. Edges: Perimeter edges reinforced by a formulated resin hardener.
9. Corners: Square.
10. Mounting: Back mounting.
11. Fabric Covering: Seamless fabric facing material, for stretched covering of core material.
 - a. Fabric: Guilford of Maine.
 - b. AP-1 (non-tackable):
 - 1) Style: Coastline 3495.
 - 2) Color: 010 Gull.
 - c. AP-2 (tackable):
 - 1) Style: Groove 3497.
 - 2) Color: 060 Mist.

- d. AP-3, Acoustical Ceiling Panels at Sector 5:
 - 1) Style: FR701, 2100.
 - 2) Color: 144 Eggshell.
- e. Patterns: Where fabric with directional or repeating patterns or fabric with directional weave is used, mark for installation in same direction.

2.03 FABRICATION

- A. General: Fabricate panels to sizes and configurations indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
 - 1. Where radiused or mitered corners are indicated, install fabric to avoid seams or gathering of material.
 - 2. For panels suspended from ceiling, provide fabric covering both sides, with seams only at panel edges.
- B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 in for thickness, overall length and width, and squareness from corner to corner.

2.04 ACCESSORIES

- A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:
 - 1. Two-part clip and base-support bracket system; brackets designed to support full weight of panels and clips designed for lateral support, with one part mechanically attached to back of panel and the other attached to substrate.
 - 2. Metal impaling clips designed to support full weight of panels, mechanically attached to substrate and adhesively bonded to back of panels.
 - 3. Z-clip hanger and magnet system with magnets recessed into panel frame and designed to engage steel mounting plates secured to substrate with screws.
- B. Ceiling-Suspended Accessories: Manufacturer's standard through-threaded eyelets bolted through concealed perimeter frame at 1/4 points on each panel, sized appropriately for weight of panels.
 - 1. Provide galvanized wire for suspension from ceiling at heights indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of acoustical panels. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install acoustical panels in locations indicated, following installation recommendations of panel manufacturer. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
- B. Suspend ceiling baffles at locations and heights indicated.
- C. Install panels to construction tolerances of plus or minus 1/16 in for the following:
 - 1. Plumb and level.

2. Flatness.
3. Width of joints.

3.03 CLEANING

- A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.
- B. Remove surplus materials, trimmed portions of panels, and debris resulting from installation.

3.04 PROTECTION

- A. Provide protection of installed acoustical panels until completion of the work.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Mechanical and Electrical:
 - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - c. On the roof and outdoors, paint all equipment that is exposed to weather or to view, including that which is factory-finished.
 - d. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically so indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

- A. Conform to ASTM D 16 for interpretation of terms used in this section in addition to the following:
- B. Paint: The term, as used in this Section, means all coating system components, including primers, emulsions, enamels, varnishes, stains, lacquers, sealers, fillers, and other applied materials whether used as prime, intermediate or finish coat.
- C. Definitions of painting terms: ASTM D 16, unless otherwise specified.
- D. Dry film thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000-inch).

- E. Gloss: Reflection of light from a surface that is independent of color.
- F. Luster: Shine, gloss, sheen or brilliance of a surface (e.g. low luster).
- G. Matte: Flat finish.
- H. Sheen: The terms used in these Specifications refer to the following gloss ranges when tested in accordance with ASTM D 523 test method.

	Gloss at 60 deg	Sheen at 85 deg
Gloss Level 1 Traditional matte finish - flat	maximum 5 units	and maximum 10 units
Gloss Level 2 High side sheen flat-'velvet-like' finish	maximum 10 units	and 10-35 units
Gloss Level 3 Traditional 'eggshell-like' finish	10-25 units	and 10-35 units
Gloss Level 4 Satin-like'finish	20-35 units	and minimum 35 units
Gloss Level 5 Traditional semi-gloss	35-70 units	
Gloss Level 6 Traditional gloss	70-85 units	
Gloss Level 7 High gloss	more than 85 units	

- I. Coat: As used in this Section means a layer of paint, varnish, lacquer, or other material applied, then allowed to dry. To backroll or apply a wet-on-wet film still constitutes a single coat.
- J. Finish: As used in this Section means the entire coating system including the texture, color, and sheen of a surface.
- K. Refinish: As used in this Section implies a new finish will be applied to a surface that has been finished as defined above.
- L. Touchup: As used in this Section means correction of deficiencies in the specified work to achieve a properly painted surface.

1.03 SUBMITTALS

- A. See Section 01330 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 9 by 12 inch in size.
- D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 - 2. Label each container with color in addition to the manufacturer's label.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 5 years documented experience.

- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 - 1. Base Manufacturer: Frazee Paint, a Comex Group Company: www.frazee.com..
 - 2. Dunn-Edwards Paints, www.dunnedwards.com.
 - 3. Glidden Professional: www.gliddenprofessional.com.
 - 4. Kelly Moore: www.kellymoore.com.
 - 5. PPG Architectural Finishes, Inc: www.ppgaf.com.
 - 6. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 4. Supply each coating material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
 - 1) Opaque, Flat: 50 g/L, maximum.
 - 2) Opaque, Nonflat: 100 g/L, maximum.
 - 3) Opaque, High Gloss: 150 g/L, maximum.
 - 4) Varnishes: 350 g/L, maximum.
 - c. Architectural coatings VOC limits of California.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Chemical Content: The following compounds are prohibited:
1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.
- E. Colors: As indicated on drawings
1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
1. One coat of waterbourne acrylic primer; 661 F Metal Primer.

2. Semi-gloss: Two coats of enamel; 124 Mirro Glide S/C.
- B. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 1. Touch-up with latex primer: 561 Acrylic Metal Primer.
 2. Semi-gloss: Two coats of enamel; 124 Mirro Glide S/C.
- C. Paint Mgl-OP-3L - Galvanized Metals, Latex, 3 Coat:
 1. One coat galvanize primer; 561 Acrylic Metal Primer.
 2. Semi-gloss: Two coats of latex enamel; 124 Mirro Glide S/C.
- D. Paint Mal-OP-3L - Aluminum, Unprimed, Latex, 3 Coat:
 1. One coat primer: 561 Acrylic Metal Primer.
 2. Semi-gloss: Two coats of latex enamel; 124 Mirro Glide S/C.
- E. Paint GI-OP-3LA - Gypsum Board/Plaster, Latex-Acrylic, 3 Coat:
 1. One coat of water-based primer sealer; 061 Aqua Seal II.
 2. Gloss: Two coats of latex-acrylic enamel; 143 Mirro Glide GL.
 3. Semi-gloss: Two coats of latex enamel; 124 Mirro Glide S/C.
 4. Eggshell: Two coats of finish paint; 022 Lo-Glo.
 5. Flat: Two coats of latex; 007 Velvin.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
 1. For Concrete: Plastic Filler (Bondo)
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Plaster and Stucco: 12 percent.
 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 4. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.
 5. Concrete Floors and Traffic Surfaces: 8 percent.

6. Measure pH level of concrete slab at least 30 days after placement to confirm pH level < 10. Should pH level be >10, notify Architect and paint manufacturer.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing coatings that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- J. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- K. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- L. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- M. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- N. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- O. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is

applied.

- E. Apply each coat to uniform appearance.
- F. Sand metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to Section 15190 and Section 16010 for schedule of color coding of equipment, duct work, piping, and conduit.
- B. Paint shop-primed equipment, where indicated.
- C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

3.07 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically noted.
 - 2. Fire rating labels, equipment serial number and capacity labels.
 - 3. Stainless steel items.
- B. Paint the surfaces described below under Schedule - Paint Systems.
- C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
 - 1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
 - a. See Finish Schedule for conduit colors.
 - 2. Paint shop-primed items occurring in finished areas.
 - 3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.

4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
 5. Paint exposed exterior ductwork on roof.
 - a. Color: To match Architect's control sample.
 6. Paint ductwork in interior occupied areas.
 - a. Color: LMC Grey.
 7. Color for ductwork and supports as indicated in Finish Schedule.
- D. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

END OF SECTION

SECTION 10100
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tackboards.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures.
- B. Product Data: Provide manufacturer's data on tackboard, trim, and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Submit color charts for selection of color and texture of tackboard and trim.
- E. Manufacturer's printed installation instructions.
- F. Maintenance Data: Include data on regular cleaning, stain removal.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- B. Flammability and toxicity: Provide materials complying with Code for flammability and toxicity and the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame spread: 25 or less.
 - 2. Smoke developed: 450 or less.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Visual Display Boards:
 - 1. Basis of Design: Claridge Products.
 - 2. Acceptable Manufacturers:
 - a. Marsh Industries: www.marsh-ind.com.
 - 3. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 VISUAL DISPLAY BOARDS

- A. Tackboards: Fine-grained, homogeneous natural cork.
 - 1. Basis of Design: Model 900A.
 - 2. Cork Thickness: 1/8 inch.
 - 3. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.

4. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E 84.
5. Size: As indicated on drawings.
6. Frame: Same type and finish as for markerboard.
7. Frame Profile: 1-1/4 inch aluminum frame.
8. Frame Finish: Anodized, natural.
9. Accessories: Provide map rail.
10. Color: Natural cork, to match Architect's sample.

2.03 MATERIALS

- A. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
- B. Adhesives: Type used by manufacturer.

2.04 ACCESSORIES

- A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.
- B. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.
- C. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Install with bottom of perimeter frame as indicated on drawings; if not indicated, then mount at 30 inches above finished floor.
- C. Secure units level and plumb.
- D. Carefully cut holes in boards for thermostats, wall switches, and fire alarms.

3.03 CLEANING

- A. Cover with protective cover, taped to frame.
- B. Remove temporary protective cover at date of Substantial Completion.

END OF SECTION

SECTION 10400
IDENTIFICATION DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Code compliance signage.
- C. Emergency evacuation maps.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.
- G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Flammability and toxicity: Provide materials complying with Code for flammability and toxicity and the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame spread: 25 or less.
 - 2. Smoke developed: 450 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.

- C. Store tape adhesive at normal room temperature.

1.05 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flat Signs:
 - 1. Best Sign Systems, Inc: www.bestsigns.com.
 - 2. Mohawk Sign Systems, Inc: www.mohawksign.com.
 - 3. Seton Identification Products: www.seton.com/aec.
 - 4. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: All signs are required to comply with ADAAG and ANSI/ICC A 117.1 and California Building Code, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. All Signage Types: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Background Color: In accordance with Campus Standards, if no standard, then clear.
 - 4. Character Color: In accordance with Campus Standards, if no standard, then contrasting color.
- C. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Braille shall be rounded or contracted domed top.
 - 4. Character Height: 1 inch.
 - 5. Sign Height: 2 inches, unless otherwise indicated.
 - 6. Office Doors: Identify with the room numbers shown on the drawings.
 - 7. Conference and Meeting Rooms: Identify with the room numbers shown on the drawings.
 - 8. Service Rooms: Identify with the room names and numbers shown on the drawings.
 - 9. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", and braille.
- D. Emergency Evacuation Maps:
 - 1. Allow for one map per elevator lobby.

2. Map content to be provided by Owner.
 3. Use clear plastic panel silk-screened on reverse, in brushed aluminum frame, screw-mounted.
- E. See typical sign layout and size on drawings.

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
1. Edges: Square.
 2. Corners: Radiused.
 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
1. Character Font: Helvetica, Arial, or other sans serif font.
 2. Character Case: Upper case only.
 3. Background Color: White per campus standard color.
 4. Character Color: Black per campus standard color.

2.04 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
1. Total Thickness: 1/4 inch.
 2. Panel Edges: Square.
 3. Panel Corners: as shown on drawings.
 4. Mounting: adhesive.

2.05 BRAILLE SYMBOLS

- A. Braille Symbols: California Contracted Grade 2 Braille shall be used wherever Braille symbols are specifically required in other portions of these standards. Dots shall be 1/10-inch on centers in each cell with 2/10-inch space between cells. Dots shall be raised a minimum of 1/40-inch above the background.

2.06 NON-TACTILE SIGNAGE MEDIA

- A. Silk Screened Plastic Panels: Letters and graphics silk screened onto reverse side of plastic surface:
1. Sign Color: Clear.
 2. Total Thickness: 1/8 inch.

2.07 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
1. Interior: Bright finish.

- B. Tape Adhesive: Double sided tape, permanent adhesive.
 - 1. Completely cover the plate with adhesive.
- C. Where flat signs are mounted on glass walls:
 - 1. Provide an additional blank plate with same background color.
 - 2. Mount this plate on the inside of glass in alignment with sign plate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated:
 - 1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign as indicated on drawings. If not indicated, then mount at 60 inches above finished floor.
 - 2. If no location is indicated obtain Owner's instructions.
- D. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION

SECTION 10523

FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 SUBMITTALS

- A. See Section 01330 - Submittal Procedures, for submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features, color and finish, anchorage details, and physical and rough-in dimensions.
- D. Product Data:
 - 1. Extinguisher: Provide extinguisher operational features, color and finish, rated capacity and physical dimensions.
 - 2. Cabinet: Physical and rough-in dimensions, fire-rating if required, color and materials.
- E. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguisher Cabinets and Accessories:
 - 1. Basis of Design: Potter-Roemer; www.potterroemer.com.
 - 2. Acceptable Manufacturers:
 - a. JL Industries, Inc: www.jlindustries.com.
 - b. Larsen's Manufacturing Co: www.larsensmfg.com.
 - c. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by Underwriters Laboratories Inc. for the purpose specified and indicated, with current certification tags attached.
- B. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
 - 1. Class: A:B:C.
 - 2. Size: 10 pound, 4A:80B:C.

3. Finish: Baked polyester powder coat, red color.

2.03 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed primed steel sheet; 0.036 inch thick base metal.
- B. Cabinet Configuration, Type 1: Semi-recessed type, #1772.
 1. Sized to accommodate accessories.
 2. Exterior nominal dimensions of 9 inch wide x 24 inch high x 5-3/4 inch deep.
 3. Trim: Returned to wall surface, with 4-1/2 inch projection, 1-3/8 inch wide face.
- C. Door Glazing: Glass, clear, 1/8 inch thick float. Set in resilient channel gasket glazing.
- D. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- E. Weld, fill, and grind components smooth.
- F. Provide Break-away lock for emergency access to fire extinguisher.
- G. Finish of Cabinet Exterior Trim and Door: Primed for field paint finish.
- H. Finish of Cabinet Interior: White enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings at locations shown on drawings.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets at time of Certificate of Occupancy.
- E. Extinguishers must have current certification tags attached
- F. Place extinguishers and accessories in cabinets at time of Substantial Completion.

END OF SECTION

SECTION 12493

VERTICAL LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vertical louver blinds at all new and existing exterior and interior windows with-in Remodel Areas, unless otherwise noted on Drawings.

1.02 DEFINITIONS

- A. Light and Privacy Scale:
 - 1. Level One (1): Reduces glare and still reveals considerable details to the outside, provides no privacy.
 - 2. Level Two (2): Softens the light and still reveals some details to the outside. Provides moderate privacy.
 - 3. Level Three (3): Softens the light but reveals shadow-like outlines to the outside, provides substantial privacy.
 - 4. Level Four (4): Diffuses the light and reveals no shape or details to the outside. Provides complete privacy and room-darkening options.
 - 5. Level Five (5): Blocks virtually all the light and provides the most privacy and light control available.

1.03 SUBMITTALS

- A. See Section -01330 - Submittal Procedures.
- B. Certification: Provide certification that product complies with WCMA A100.1.
- C. Selection Samples: For vanes, color chips or material samples representing manufacturer's full range of available colors and patterns.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum five years of experience.
- C. Flammability and toxicity: Provide materials complying with Code for flammability and toxicity and the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame spread: 25 or less.
 - 2. Smoke developed: 450 or less.
- D. Mock-Up: For evaluation of light and privacy characteristics only, provide a mock-up at least 2 feet wide by full height of louvers intended for use.
 - 1. Full-sized mock-up may become part of the final installation.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. If blinds are delivered early and stored at the project, deliver in unopened containers; handle and store in such a manner to protect them from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Vertical Louver Blinds:
 - 1. Basis of Design: Vertical Solutions by Hunter Douglas, : www.hunterdouglas.com.
 - 2. The following manufacturers providing products meeting these requirements are acceptable:
 - a. Levolor Contract: www.levolorcontract.com.
 - b. Graber, division of Springs Window Fashions: www.graberblinds.com.
 - c. Substitutions: See Section 01625 - Product Options and Substitutions.

2.02 BLINDS AND BLIND COMPONENTS

- A. Vertical Louver Blinds: Horizontal travel, vertical louver units complete with tracks, pivot and traversing mechanisms, and accessories, as follows:
 - 1. Louvers: PVC louver blades of the size indicated.
 - 2. Light and Privacy Scale: Level 4.
 - 3. Operation: Manual.
 - 4. Direction of Travel: As indicated on the drawings.
 - 5. Mounting: Inside (between jambs).
 - 6. Cord and Chain Operation: Comply with WCMA A100.1.
- B. Tracks: Channel tracks as required for type of operation, extruded aluminum with clear anodized finish, with end caps.
 - 1. Louver Rotation: Chain driven direct rotation by activating tilt gear within end cap assembly in turn actuating tilt rod and worm-and-spur gears in carrier trucks.
 - 2. Operating Components: Internally mounted heavy-duty extruded aluminum tilt rod, louver carriers, and other components required for proper performance and designed for smooth, quiet, trouble free operation.
 - 3. Pivot Mechanism: Geared for synchronous 180 degrees rotation of louver blades and type of operation indicated.
 - 4. Louver Carriers: Metal carriers with ball-bearing wheels or thermoplastic trucks, equipped with linkages or other devices to ensure positive spacing of louver blades.
 - 5. Tilt Chain: Nickel plated brass beaded ball chain, minimum 1/8 inch diameter; locate at drawback side of units as indicated.
- C. PVC Vanes: Integrally colored, extruded PVC; flat, 3-1/2 inches (80mm) wide.
 - 1. Flammability: Comply with NFPA 701.
 - 2. Color: As selected by Architect from manufacturer's full range of colors.

3. Texture: Smooth.
- D. Brackets and Mounting Hardware: As recommended by manufacturer for the mounting configuration and span indicated; provide manufacturer's standard L- bracket with clip for outside mounting and clip only for inside mounting.

2.03 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Fabricate blinds to fit openings within specified tolerances.
 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom of vanes and finish floor.
 2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.
- C. Dimensional Tolerances: Fabricate blinds to within plus/minus 1/8 inch of intended dimensions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not start installation before openings are finished and all finishes have been completed; do not install until painting is completed.
- B. Examine finished openings for deficiencies that may preclude satisfactory installation.
- C. Start of installation shall be considered acceptance of substrates.
- D. Field measure finished openings prior to ordering or fabrication.

3.02 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Coordinate the work with window installation and placement of concealed blocking to support blinds.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions using mounting style as indicated.
- B. Installation Tolerances:
 1. Inside Mounting: Maximum space between vane and jamb when closed of 1/16 inch.
 2. Maximum Offset From Level: 1/16 inch.
- C. Adjust blinds for smooth operation.
- D. Replace blinds that exceed specified dimensional tolerances at no extra cost to Owner.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Work Included: Work included in 15010 applies to Division 15 work to provide materials, labor, tools, permits and incidentals to provide and make ready for Owner's use heating, ventilation, air conditioning, and plumbing, and fire protection systems for proposed project.
- B. Related Work Specified Elsewhere:
 - 1. Contents of Section applies to Division 15 specifications.
 - 2. Requirements of Section are a minimum for Division 15 Sections, unless otherwise stated in each Section, in which case that Section's requirements take precedence.

1.02 DEFINITIONS

- A. Following is a list of abbreviations generally used in Division 15:
 - 1. ADA Americans with Disabilities Act.
 - 2. AHJ Authority Having Jurisdiction.
 - 3. ANSI American National Standards Institute.
 - 4. ARI Air-Conditioning & Refrigeration Institute.
 - 5. ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers.
 - 6. ASME American Society of Mechanical Engineers.
 - 7. ASTM American Society for Testing and Materials.
 - 8. ASSE American Society of Sanitary Engineering.
 - 9. AWWA American Water Works Association.
 - 10. CBC California Building Code.
 - 11. CEC California Electrical Code.
 - 12. CMC California Mechanical Code.
 - 13. CPC California Plumbing Code.
 - 14. CGA Canadian Gas Association.
 - 15. CISPI Cast Iron Soil Pipe Institute.
 - 16. CSA Canadian Standards Association.

1.03 ADDITIONAL REQUIREMENTS TO DIVISION 1

- A. Operation and Maintenance Documentation: Copies of certificates of code authority acceptance, test data, parts lists, maintenance information for equipment, valves, balancing reports, equipment start-up documentation, and other special guarantees, certificates of warranties, and the like, specified elsewhere herein or indicated on Drawings.
- B. Shop Drawings: Provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.
- C. Close-out Documentation: Submit mechanical/plumbing code authority certification of inspection.
- D. Record Drawings:
 - 1. Show changes and deviations from the Drawings. Include issued Addendum and change order items.
 - 2. Make changes to the Drawings in a neat, clean, and legible manner.

- E. Product Data:
1. Submit manufacturer's technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, supplied or provided. Refer to individual specification sections for specific items required in product data submittal. Submit at one time in 3-ring binder, tabbed and referenced to match the Contract Documents.
 2. Maintain an updated product submittal package to be included in the final operation and maintenance documentation.

1.04 QUALITY ASSURANCE

- A. Where Contract Documents are at variance with applicable codes governing work, code and local jurisdiction requirements take precedence, and include cost necessary for code compliance or local jurisdiction compliance in bid price. Machinery and equipment to comply with Occupational Safety and Health Act of 1970, as currently revised, as interpreted for equipment manufacturer requirements.
- B. Mechanical Drawings: Drawings are intended to be diagrammatic and are based on one manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., ducts and piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than basis of design, including but not limited to architectural, structural, electrical, HVAC, fire sprinkler, and plumbing.
- C. Requirements: As a minimum requirement, work in accordance with following rules and regulations and applicable laws:
1. NFPA.
 2. OSHA.
 3. California State Energy Code.
 4. California Building Code.
 5. California Mechanical Code.
 6. California Plumbing Code.
 7. State of California and local jurisdictional requirements.
- D. Permits and Inspections:
1. Unless otherwise distinctly hereinafter specified, apply and pay for necessary permits, plans check, and inspections required by public AHJ.
 2. Refer to General and Supplementary Conditions for payment of water and sewer service connection fees.
 3. Obtain certificates of inspection from AHJs and deliver to Owner before final acceptance.
 4. Each trade to consult local building department and utility companies prior to commencement of work to ascertain existence and location of existing underground utilities. Protect existing service against damage and interruption of use, and reroute as may be necessary to accomplish new work. Include costs for materials and installation for rerouting as specified for new work in bid price.

1.05 SEQUENCING AND SCHEDULING

- A. For proper execution of work cooperate with other trades as needed.
- B. To avoid installation conflicts, thoroughly examine complete set of Contract Documents. Resolve conflicts with Architect prior to fabrication and installation.

- C. Prior to installation of equipment requiring electrical connections, examine manufacturer's shop drawings, wiring diagrams, product data, and installation instructions. Verify that electrical characteristics indicated in Contract Documents are consistent with electrical characteristics of actual equipment being installed. When inconsistencies occur request clarification from Architect.

1.06 TEMPORARY HEATING

- A. Temporary heating for facility during construction phase not to be supplied by permanent system installed under these Specifications.
- B. Exception:
 - 1. Extend product warranties to account for construction use. Furnish certified document stating such extended warranties.
 - 2. Pressure clean coils and vacuum clean ductwork prior to occupancy.

1.07 COORDINATION DOCUMENTS

- A. Prepare and submit coordinated layout drawings, prior to construction, to coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, fire sprinklers, plumbing, lights, and electrical services. Composite Drawings show services on single sheet. Key Drawings to structural column identification system, and progressively number. Prior to completion of Drawings, coordinate proposed installation with architectural and structural requirements, and other trades (including plumbing, fire protection, electrical, ceiling suspension, and tile systems), and provide reasonable maintenance access requirements.
- B. Prepare Drawings as follows:
 - 1. Prepare Drawings to accurate scale of 1/4 inch = 1 foot or larger on Mylar sheets or AutoCAD. Drawings are to be same size as Contract Drawings and to indicate location, size and elevation above finished floor of HVAC/plumbing equipment, ductwork, and piping. Drawings to also indicate proposed ceiling grid and lighting layout as shown on electrical drawings and reflected ceiling drawings.
 - 2. Review and revise as necessary section cuts in Contract Drawings after verification of field conditions.
 - 3. Indicate plumbing system piping including fittings, hangers, access panels, valves, and bottom of pipe elevations above finished floor.
 - 4. Piping that must be graded to have right-of-way over more flexible items.
 - 5. Drawings are to incorporate Addenda items and change orders.
 - 6. Distribute drawings to trades and provide additional coordination as needed.
- C. Advise Architect, in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.
- D. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise Architect of discrepancies between that indicated on Drawings and that existing in field prior to installation related thereto.
- E. Final coordination drawings with appropriate information added to be submitted as Record Drawings at completion of project.

PART 2 - PRODUCTS

2.01 HAZARDOUS MATERIALS

- A. Do not use products containing asbestos, lead, arsenic, or any other material defined by EPA as hazardous to human or animal life.

2.02 MATERIALS

- A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, the latest products as listed in manufacturer's printed catalog data and are to be UL or CSA approved or acceptable by state, county, and city authorities. Equipment supplier is responsible for obtaining state, county, and city acceptance on equipment not UL approved or not listed for installation.
- B. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.
- C. Trade names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

- A. Install equipment having components requiring access (i.e., drain pans, drains, fire dampers, control dampers, control operators, valves, motors, drives, and the like) so that they may be serviced, reset, replaced or recalibrated and the like, by service people with normal service tools and equipment. Notify Architect in writing if equipment or components are shown in such a position that above cannot be accomplished.
- B. Install equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment, examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods and sequencing, in coordination with other trades and disciplines.
- C. Earthwork:
 - 1. Refer to Division 2.
 - 2. Perform excavation and backfill for installation of mechanical work.
- D. Firestopping:
 - 1. Coordinate with Drawings location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated, seal around piping, ductwork, equipment, and the like, with approved firestopping material.
 - 2. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814.

3.02 SEISMIC CONTROL

- A. Provide the following: Provide per Section 15240, Mechanical Equipment Sound, Vibration and Seismic Control.
 - 1. General:
 - a. Earthquake resistant designs for mechanical equipment, i.e., air handling units, water heaters, blowers, motors, ductwork, mechanical and plumbing piping, to conform to regulations of CBC.
 - b. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment piping, ductwork, and the like, to withstand a force in direction equal to value defined in CBC.
 - c. Retain licensed structural engineer to provide shop drawings of seismic bracing and seismic movement assemblies for piping/ ductwork/ equipment/ water heaters, and the like. Engineer to design and provide stamped shop drawings for equipment, ductwork, water heaters, piping seismic bracing, and the like. Submit shop drawings along with equipment submittals.

- d. Retain licensed structural engineer to provide shop drawings of seismic flexible joints for piping/ductwork and the like crossing building expansion or seismic joints. Engineer to design and provide stamped shop drawings for piping/ductwork flexible seismic joints. Coordinate actual design deflection or travel with project structural engineer. Submit shop drawings along with seismic bracing details. Coordinate exact design requirements from project structural engineer.
- 2. Piping and Ductwork:
 - a. Use "Seismic Restraints Manual Guidelines for Mechanical Systems," published by SMACNA.
 - b. Sway bracing is not required for pipes that are installed on very short individual hangers (12 inch or less).
 - c. As approved by code authority, use a bracing system manufactured by Tolco, Superstrut, Mason, or Pipe Shields Inc. or approved.
- 3. Equipment:
 - a. Provide a means to prohibit excessive motion of mechanical equipment during earthquake.
 - b. Provide mechanical equipment, both hanging and base mounted, with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight.

3.03 REVIEW BY ENGINEER

- A. Notify Architect/Engineer, in writing, at following stages of construction so that Architect/Engineer may, at their option, visit site for review and construction observation:
 - 1. Plumbing:
 - a. Underground piping installation prior to backfilling.
 - b. Prior to covering walls.
 - c. When ceiling installation is started.
 - d. When main systems, or portions of, are being tested and ready for inspection by AHJ.
 - 2. HVAC:
 - a. When ductwork installation starts.
 - b. When installation starts for each different major type of equipment.
 - c. When ceiling installation is started.
 - d. When lines or ducts are to be permanently concealed by construction or insulation systems.
 - e. When balancing and testing is started.

3.04 OPERATING DURING CHANGEOVER

- A. During remodeling of existing structure, or addition of a structure to existing structure, while existing structure is occupied, present services to remain intact until new construction, facilities or equipment is installed.
- B. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new piping, wiring, and the like, to point of connection.
- C. Perform actual transfer to new service at off-peak time, as coordinated with Owner. Once changeover is started, pursue it to its completion, to keep interference to a minimum.

3.05 MUTILATION

- A. Repair mutilation of building around pipes, ducts, fixtures, and the like.

3.06 DEMOLITION

- A. Scope:
 - 1. It is intent of these documents to provide necessary information and adjustments to mechanical system required to meet code, and accommodate installation of new work.

2. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas.
 3. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve underground utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.
- B. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of the demolition process are the Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.
 - C. Unless specifically indicated on the Drawings, the Contractor shall remove exposed, unused piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap piping and patch surfaces to match surrounding finish.
 - D. Unless specifically indicated on the Drawings, the Contractor shall remove unused equipment, fixtures, fittings, rough-ins, connectors, etc. Removal is to be to a point behind finished surfaces (floors, walls, ceilings, etc.).

3.07 EQUIPMENT SELECTION AND SERVICEABILITY

- A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.
- B. Maintain design intent where equipment other than as shown in Contract Documents is provided. Where equipment requires piping arrangement, control diagrams, or sequencing different from that indicated in Contract Documents, provide electrical motors, wiring, controls, or other required electrical components at no additional cost to Owner.

3.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials and equipment in a manner to prevent damage and deterioration. Store in original container which identifies manufacturer's name, brand and model number. Do not store indoor equipment outdoors unless provided with a waterproof protective cover.
- B. Replacement: In event of damage, immediately make repairs and replacements necessary.

3.09 DEMONSTRATION

- A. Upon completion of work and adjustment of equipment, test systems to demonstrate to Owner's Representative and Architect that equipment furnished and installed or connected under provisions of these Specifications functions mechanically in manner required.
- B. Manufacturer's Field Services: Furnish services of a qualified person for a period of not less than 40 hours, at a time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in a satisfactory manner and complies with requirements of other trades or Contractors that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.10 CLEANING

- A. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated by this work.

3.11 INSTALLATION

- A. Install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level, firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.
- B. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
 - 1. Do not place equipment in sustained operation prior to initial balancing of mechanical systems.
 - 2. Furnish sufficient refrigerant and dry nitrogen for pressure testing under manufacturer's supervision.
 - 3. Provide and install additional fan sheaves and pump impellers to obtain design capacities. Coordinate exact requirements with balancing firm.

3.12 PAINTING

- A. Ferrous Metal: After completion of mechanical work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in mechanical rooms, i.e., hangers, hanger rods, equipment stands, and the like, with one coat of black asphalt varnish or black enamel suitable for hot surfaces.
- B. Machinery:
 - 1. In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.
 - 2. See individual equipment Specifications for other painting.
 - 3. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.
- C. Piping: Clean, primer coat and paint exposed piping on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.

3.13 CUTTING AND PATCHING

- A. Refer to Division 1, Section "Cutting and Patching."

3.14 ACCEPTANCE

- A. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
 - 1. Testing and balancing reports.
 - 2. Cleaning.
 - 3. System balancing and balancing logs.
 - 4. Operating and Maintenance Manuals.
 - 5. Training of operating personnel. Provide a minimum 40 hours of factory training (BAS) by Andover's controller and by AHU's manufacturer.
 - 6. Record Drawings.
 - 7. Guaranty certificates.
 - 8. Start-up and test document.
 - 9. Letter of conformance.

3.15 LETTER OF CONFORMANCE

- A. Provide letter and copies of extended warranties with a statement in letter that mechanical items were installed in accordance with manufacturer's recommendations. Include letter of conformance and warranties in operating and maintenance manuals.
- B. Warranties to begin at date of substantial completion.

END OF SECTION

SECTION 15040

ACCEPTANCE TESTING AND DOCUMENTATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This section describes the Acceptance Testing and documentation of the mechanical system(s) and outlines the duties and responsibilities of the contracting team for Acceptance Testing.
- B. Apply the Acceptance requirements to products, equipment and systems provided under this Division, where indicated on plans, and where required by California Title 24 requirements.
- C. Engage the services of a firm specializing in commissioning of mechanical systems or shall submit contractor qualifications for review by architect where testing and documentation is to be performed by contractor. Where duct pressure testing validation is required, submit name and qualification for HERS Certified testing agency.

PART 2 - PRODUCTS

2.01 DUTIES OF THE TEAM

- A. The duties of the Team are as outlined in the Title 24 Requirements and summarized below:
 - 1. Plan, organize and implement the Acceptance Testing process and within 1 month of the award of the contract, submit the names and addresses of the Testing team member(s).
 - 2. The Acceptance testing team shall submit a complete description of the testing procedures and systems to be tested to the architect for review.
 - 3. The Acceptance testing team shall coordinate tests of systems and equipment and assemble documentation related to tests. Submit documentation relative to tests and proposed procedures to design engineer for review prior to submitting documentation to Authority having Jurisdiction (AHJ.) Team responsible for performing data analysis, calculation of performance indices and crosschecking of results with the requirements of Title 24 and the Contract documents. The installing contractor or agent responsible for testing and documentation shall record their State of California Contractor's license number or their State of California Professional Registration License number on each Certificate of Acceptance for submittal.
 - 4. Responsible for submitting Certificate of Acceptance including paper and electronic copies of measurements and monitoring results and supporting documentation to the AHJ. Where AHJ questions results or requires additional testing, complete additional testing and provide required documentation at no additional cost to the Owner.

2.02 TIME SCHEDULE

- A. Determine the time period of the commissioning of the systems by the general contractor and Acceptance testing team. It is important to note that AHJ will not release a final Certificate of Occupancy until a Certificate of Acceptance is submitted that demonstrates that the specified systems and equipment have been shown to be performing in accordance with the Title 24 standards.

2.03 ACCEPTANCE TESTING – PHASE I - DOCUMENTATION

- A. Team shall assemble documentation showing thermostat and sensor locations, control device locations, control sequences and notes.
- B. Per Title 24 requirements, team shall provide record drawings to building owner within 90 days of receiving a final occupancy permit (refer to other specification sections for requirements on record drawings.)

- C. Per Title 24 requirements, team shall provide operating and maintenance manuals to the building owner (refer to other specification sections for requirements on operation and maintenance manuals.)

2.04 ACCEPTANCE TESTING – PHASE II – INSPECTION AND TESTING

- A. Team shall review the installation, perform acceptance testing and document results for the following systems:
 - 1. Constant Volume Systems
 - 2. Air Handling Systems
 - 3. Air Distribution Systems
 - 4. Economizers
 - 5. Ventilation Systems
 - 6. Hydronic Control Systems
 - 7. System Programming
- B. Review of installation shall confirm mechanical equipment and devices are properly located, identified, calibrated, and set points and schedules programmed per contract document requirements.

2.05 ACCEPTANCE TESTING - PHASE III - CERTIFICATION

- A. Team shall document operating and maintenance information, complete installation certificate, and indicate test results on the Certificate of Acceptance, and submit the Certificate to the AHJ prior to receiving final occupancy permit. Team shall submit forms MECH-1-A through MECH-9-A as required by Title 24 requirements.

PART 3 - EXECUTION

3.01 ACCEPTANCE TESTS AND DOCUMENTATION

- A. Refer to California Title 24, Non-residential manual for specific testing procedures and documentation requirements. The detailed requirements can be found at <http://www.energy.ca.gov/title24/2008standards/index.html>. Contractor is responsible for reviewing and complying with these standards

END OF SECTION

SECTION 15250

INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Ductwork Insulation - Materials and installation of duct insulation including the following applications:
 - 1. Air conditioning and heating ductwork.

1.02 QUALITY ASSURANCE

- A. Qualification of Workers: Use proficient journeyman insulators and supervisors in the execution of this portion of the work to ensure proper and adequate installation of insulation throughout. A firm with at least 5 years successful installation experience on projects with installations similar to that required for this project.
- B. Compliance with Specifications:
 - 1. Whenever required during progress of the work, furnish proof acceptable to the Owner that items installed are equal to or exceed requirements specified for this work.
 - 2. In the event such proof is not available, or is not acceptable to the Owner, the Owner may require the Contractor to remove the item or items and replace with material meeting the specified requirements and to repair damage caused in the removal and replacement, at no additional cost to the Owner.
 - 3. Install per manufacturer's written instructions.
 - 4. As a minimum, comply with appropriate state energy code or other applicable codes.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of insulation, jacket, glue, paint, fitting cover, and accessory. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each piping, equipment and duct system requiring insulation.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect insulation materials before, during and after installation.
- B. Replacements: In the event of damage, immediately make repairs and replacements necessary.

1.05 FIRE HAZARD CLASSIFICATION

- A. Maximum fire hazard classification of the composite insulation construction as installed to be not more than a flame spread of 25, fuel contributed of 50 and smoke developed of 50 as tested by ASTM E84 (NFPA 255) method.
- B. Test pipe insulation in accordance with the requirements of UL "Pipe and Equipment Coverings R5583 400 8.15."
- C. Test duct insulation in accordance with ASTM E84 and bear the UL label.

1.06 LINING MATERIALS

- A. Materials to be mold-, humidity-, and erosion-resistant surface that meets the requirements of UL 181.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Ductwork: Armacell LLC Armaflex, Certainteed, Johns Manville, Knauf, Owens-Corning, PPG, or approved.

2.02 TYPE 10, FLEXIBLE FIBERGLASS BLANKET

- A. ASTM C553, Type 1, Class B-2; flexible blanket.
- B. 'K' Value: 0.27 at 75F installed.
- C. Density: 0.75 lb./cu.ft.
- D. Vapor Barrier Jacket: FSK aluminum foil reinforced with fiberglass yarn and laminated to fire resistant Kraft, secured with UL listed pressure sensitive tape or outward clinched expanded staples and vapor barrier mastic as needed.

2.03 TYPE 11, DUCT LINER

- A. ASTM C1071; flexible blanket.
- B. 'K' Value: ASTM C518, 0.25 at 75F.
- C. Noise Reduction Coefficient: 0.65 or higher based on "Type A mounting."
- D. Maximum Velocity on Mat or Coated Air Side: 5,000 FPM
- E. Adhesive: UL listed waterproof type.
- F. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened.
- G. Mold-, Humidity-, and Erosion-Resistant Surfaces: UL 181.

PART 3 - EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Do not apply insulation until pressure testing of the ducts has been completed. Do not apply insulation until the duct has been inspected.
- B. Examine areas and conditions under which duct insulation will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean and dry surfaces to be insulated.

3.03 INSTALLATION

- A. Insulation: Continuous through walls, floors, partitions except where noted otherwise.
- B. Ductwork:
 - 1. Install insulation in conformance with the manufacturer's recommendations to completely cover the duct.
 - 2. Butt insulation joints firmly together and install jackets and tapes smoothly and securely.
 - 3. Apply duct insulation continuously through sleeves and prepared openings, except as otherwise specified. Apply vapor barrier materials to form a complete unbroken vapor seal over the insulation.
 - 4. Coat staples and seals with vapor barrier coating.

5. Cover breaks in the jacket material with patches of the same material as the vapor barrier. Extend the patches not less than 2 inches beyond the break or penetration in all directions and secure with adhesive and staples. Seal staples and joints with brush coat of vapor barrier coating.
6. Fill jacket penetrations, i.e., hangers, thermometers and damper operating rods, and other voids in the insulation with vapor barrier coating. Seal the penetration with a brush coat of vapor barrier coating.
7. Seal and flash insulation terminations and pin punctures with a reinforced vapor barrier coating.
8. Continue insulation at fire dampers up to and including those portions of the fire damper frame which are visible at the outside of the rated fire barrier. Insulation terminations at fire dampers in accordance with the above.
9. Do not conceal duct access doors with insulation. Install insulation terminations at access doors in accordance with the above.
10. Duct Liners: Install mat finish surface on air stream side. Secure insulation to cleaned sheet metal duct with a continuous 100 percent coat of adhesive. For widths over 20 inches, additionally secure the liner with mechanical fasteners 15 inches on center. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation overlap sides. Keep duct liner clean and free from dust. At completion of project, vacuum duct liner if it is dirty or dusty. Cut studs off near washers. Do not use small pieces. If insulation is installed without horizontal, longitudinal, and end joints butted together, installation will be rejected and work removed and replaced with work that conforms to this Specification.
11. Duct Wrap: Cover supply air ducts except ducts internally lined. Wrap tightly with circumferential joints butted and longitudinal joints overlapped minimum of 2 inches. Adhere insulation with 4-inch strips of insulating bending adhesive at 8 inches on center. On ducts over 24 inches wide, additionally secure insulation with suitable mechanical fasteners at 18 inches on center. Circumferential and longitudinal joints stapled with flare staples 6 inches on center and covered with 3-inch-wide, foil reinforced tape.

3.04 PROTECTION AND REPLACEMENT

- A. Protect installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

3.05 FIBERGLASS INSULATION

- A. Lap seal insulation with waterproof adhesive. Do not use staples or other methods of attachment which would penetrate the vapor barrier. Apply fitting covers with seated tacks and vapor barrier tape.
- B. Apply insulation to pipe and seal with self-sealing lap. Use self-sealing butt strips to seal butt joints. Insulate fittings, valves and unions with single or multiple layers of insulation and cover to match pipe or use preformed PVC molded insulation covers.

3.06 LABELING AND MARKING

- A. Provide labels, arrows and color coding on piping. Attach labels and arrows to the jacketing.

3.07 DUCTWORK SURFACES TO BE INSULATED

Item to be Insulated:	System Insulation Type:	Duct Size:	Insulation Thickness:
Supply ductwork (where duct is not specified to be lined or where ductboard is not utilized).	10	All	1"
HVAC plenums and unit housings not preinsulated.	11	All	2"

Note: Insulation thickness shown is a minimum. If state codes require additional thickness, then provide insulation thickness per code requirements.

END OF SECTION

SECTION 15890

DUCTWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Materials, installation and testing of HVAC ductwork and accessories, including the following:
 - 1. Heating and air conditioning supply and return systems.
 - 2. Ductwork hangers.
 - 3. Plenums.

1.02 QUALITY ASSURANCE

- A. Unless otherwise noted, where the Specification refers to SMACNA in reference to sheet metal or flexible ductwork, this refers to HVAC Duct Construction Standards, Metal and Flexible, latest edition, as published by SMACNA.
- B. Unless otherwise noted, where the Specification refers to TIMA in reference to fiberglass ductwork, this refers to Fibrous Glass Duct Construction Standards, latest edition, as published by TIMA.
- C. Provide duct systems per CMC, latest edition, and all referenced standards.
- D. Have available at the project field office a copy of the referenced standards.

1.03 SUBMITTALS

- A. Provide shop drawings for duct materials, flues.
- B. Submit duct pressure testing reports. Provide individual reports for each AHU duct system.

1.04 AIR DISTRIBUTION DUCT SYSTEM

- A. General: All ductwork, including collars, register boxes, fire dampers, exhaust fans, ventilation louvers, roof vents and screens, as well as all dampers and any other miscellaneous items not specifically mentioned but necessary for a complete installation. Apply the latest standards of SMACNA and ASHRAE with respect to sheet-metal gauge and general construction for round and rectangular ducts.

PART 2 - PRODUCTS

2.01 GALVANIZED SHEET-METAL DUCTWORK

- A. General: IMC Duct Construction Standards, latest edition, or latest edition of ASHRAE Guide Table. 1-1/2 ounce galvanizing per square foot, both sides.

2.02 FLEXIBLE DUCTS

- A. General: Comply with CMC, latest edition, Class 0 or Class 1.
- B. Standard factory fabricated product, construct an inner wall of impervious vinyl or chlorinated polyethylene, permanently bonded to a vinyl or zinc-coated spring steel helix. Cover the assembly with fiberglass blanket insulation covered by an outer wall of vinyl or fiberglass-reinforced metalized vapor barrier. UL 181 listed Class 1 flexible air duct material. Overall thermal transmission no more than 0.25 (BTU/in)/(hr/sq.ft./deg. F) at 75F differential, per ASTM C335. Vapor transmission value no more than 0.10 perm, per ASTM E96. Rated for a minimum of 4-inch w.g. positive pressure and 1-inch w.g. negative pressure.

- C. Air friction correction factor of 1.3 maximum at 1000 FPM. Working air velocity of at least 2000 FPM. Flame spread rating no more than 25. Smoke development rating no more than 50 as tested per ASTM E84. Must have cataloged data on insertion loss characteristics, minimum attenuation of 29 DB for 10-foot straight length at 8-inch diameter and 500 Hz.
- D. Manufacturers: J. P. Lamborn Co., Norflex, Clevaflex, Genflex, Atco, Flexmaster, Thermaflex, or approved.

2.03 FACTORY FABRICATED METAL ROUND DUCTWORK

- A. General: Provide per CMC Duct Construction Standards, latest edition, and ASTM A527 Class 0.
- B. Round sheet metal, spiral lock seam type. Fittings: Same construction as the duct. Tap in fittings not allowed. Duct sealer: Specifically formulated for sealing field joints for round spiral lock-seam duct systems.

2.04 SHEET-METAL DUCT SEALER

- A. Hardcast "Duct-Seal 321" or United McGill. Indoor/outdoor, low VOC (<80 grams/liter), water based with fiber reinforcement.

2.05 PREFABRICATED DUCT JOINTS

- A. Manufactured flanged traverse rectangular and round duct joints.
- B. Manufacturers: Ductmate, Mez, Ward Duct Connectors, Lockformer TDC, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The duct layout shown on the Contract Drawings is diagrammatic in nature. Coordinate the ductwork routing and layout, and make alterations to the ductwork routing and layout as required to eliminate physical interferences. Where deviations in the ductwork routing as shown in the Contract Drawings are required, such alterations not to compromise the air flow, pressure drop, and sound characteristics of the duct fitting or run as shown on the Contract Drawings. Make such determination by Architect. In the event Architect determines that the installed ductwork is inconsistent with the above mentioned criteria, remove and replace at no additional cost to the Owner.
- B. Install ductwork in the location and manner shown and detailed. Review deviations required by job conditions with Architect prior to any fabrication. Provide fittings construction per SMACNA.
- C. Connect duct assemblies such as ductwork, plenums, etc., and operating machines or mechanisms such as fans, air conditioners, etc., with flexible connections per Section 15890, Vibration and Seismic Controls for HVAC Piping and Equipment.
- D. Fabricate radius elbows with centerline radius not less than 1-1/2 duct diameters.
- E. Do not install duct size transition pitch angles which exceed 30 degrees for reductions in duct size in the direction of airflow, and 15 degrees for expansions in duct size in the direction of airflow.
- F. Install single thickness turning vanes in square throat rectangular elbows and in tees. Provide 3/4-inch trailing edge on turning vanes, turned slightly past parallel to the duct.
- G. Duct sizes indicated are free inside dimensions including where internal lining is shown.
- H. Provide galvanized sheet-metal duct material for all ducts unless otherwise indicated or specified.

- I. Provide temporary closures of open ducts during construction to prevent dust and debris from entering the system.
- J. Flexible Duct:
 - 1. Install flexible duct with bend radius equal to 1.5 times the diameter. Minimum length 2 feet. Maximum length 5 feet, unless noted otherwise.
 - 2. Provide round neck grilles/diffusers or square-to-round transitions. No flex duct connections directly to square neck allowed.
 - 3. Flex duct allowed only for vertical drops to diffusers. Maximum offset angle from vertical: 30 degrees.
 - 4. Approved for use on supply ducts only; not allowed for return or exhaust.
 - 5. Flex duct allowed in concealed spaces above lay-in ceilings only.
- K. Fabricate ductwork and all sheet metal work of prime grade, lock forming quality steel in accordance with the current issues of the ASHRAE "Guide" and SMACNA standards and installed in strict conformance with SMACNA standards.
- L. Submit shop drawings for approval for all ductwork. All ductwork to be sheet metal unless specifically authorized as ductboard or other material.
- M. Construct ductwork upstream of VAV boxes for 4 -inch pressure class; downstream duct 1 -inch pressure class. All other duct 2 -inch pressure class.
- N. Round spiral duct and fittings or where required due to available clearances, use flat oval ductwork and fittings upstream of terminal units manufactured by United Sheet Metal, Rolok or approved in accordance with ASTM A527.
- O. Seal all joints and seams in supply, exhaust, and return air ductwork and plenums.
- P. Fabricate ductwork and plenums with a smooth inside surface and support and brace to prevent sagging and vibration at any time. Provide galvanized steel angles for reinforcing and bracing.
- Q. Joints:
 - 1. Carefully cut and trim all joints and seams in fabricated ducts and fitting to form a closed joint with no portion of the duct or fitting protruding into the air stream.
 - 2. Seal all joints in sheet-metal ducts in concealed locations (such as enclosed ceiling spaces) with Hardcast joint sealant system applied in accordance with manufacturer's recommendations, or use Ductmate-type joints.
 - 3. Seal all joints in sheet-metal ducts in exposed locations with sealant system applied in accordance with manufacturer's recommendations. Wipe off excess sealer on duct to give a clean finish, or use Ductmate-type joints.
 - 4. To connect sheet-metal ductwork to fiberglass ductboard, use Hardcast only.
 - 5. Standard gray duct tape not allowed.
- R. All fasteners such as sheet-metal screws, machine screws or rivets to be cadmium plated.
- S. Crimp flat duct surfaces diagonally or beaded regardless of size, unless acoustically lined.
- T. Fabricate all duct size transitions with a slope of not more than 1 foot to 5 feet where possible, but in no case more than 1 foot in 3 feet.
- U. Fabricate duct turns with the inside (smallest) radius at least equal to the duct width. Where necessary, square elbows may be used, with maximum available inside radius and with fixed single thickness curved vanes, with trailing edge extended 3/4 inch.
- V. Provide flexible connectors at connections to all equipment, in ducts crossing building expansion joints and may be used at connections of dissimilar metals. Flexible Connections: Minimum 16 ounce airtight "Ventglass" noncombustible fabric with fire retardant neoprene coating on outside, fastened with bolted galvanized steel bands. Maintain a minimum 1-inch space between the connecting surfaces.

- W. Duct Hangers and Supports:
1. Hang rectangular sheet-metal ducts with a cross sectional area of less than 7 sq.ft. with galvanized strips of No. 16 USS gauge steel 1 inch wide, and all larger ducts with steel angles and adjustable hanger rods similar to piping hangers. Support at 8 feet on center, as detailed.
 2. Anchor all ducts securely to building in such a manner as to prevent transmission of vibration to structure. Do not connect duct hanger straps to roof deck. Do not support ducts from other ducts or piping.
 3. For round sheet-metal ducts, provide duct support in accordance with SMACNA Guidelines. Verify type of building construction.
 4. Attach strap hangers installed flush with end of sheet-metal duct run to duct with sheet-metal screws.
 5. Do not install duct stiffeners on interior (air side) of unlined ductwork; install on exterior only or on interior of ductwork with duct liner.
 6. Seismic Restraint: Brace all ductwork against lateral movement as detailed in document "Seismic Restraint Manual Guidelines for Mechanical Systems" as published by SMACNA.
- X. Although not necessarily indicated on the Drawings, provide turning vanes at all mitered elbows, opposed blade balancing dampers with locking quadrants at branch ducts, volume extractors and any other applicable devices necessary for minimum duct resistance and proper system air balancing. Sufficiently stiffen all dampers to prevent noise or vibration and in no case be lighter than 20 gauge steel. Provide with accessibly located adjuster, manufactured by Young Regulator Co., Parker Kalon Corporation, or approved.
- Y. Construct all exterior ductwork or ductwork which is otherwise exposed to weather watertight.
- Z. Increase the size of all sheet-metal ducts as required to accommodate insulation lining.
- AA. Locate access doors in ductwork as required for service of fire dampers, automatic dampers and other items requiring maintenance or inspection.
- BB. Paint inside surface of all bare ductwork which is visible through face of grilles with flat black paint for all ceilings 12 feet and lower.

3.02 DUCTWORK PRESSURE TESTING

- A. Provide air pressure testing at 1.5 times maximum design static pressure (fan selection point). Test ductwork prior to connection to fan equipment. Repair leaks and retest until stipulated results are achieved.
1. Test at positive static pressure for 5 minutes with maximum air leakage not to exceed 1 percent of rated flow.
 2. Testing machine: Meet requirements of SMACNA standards. Pacific Air Products "Port-O-Lab," Rolok, United Sheet Metal, or approved.
 3. Test supply systems prior to connecting VAV boxes.
 4. Perform all tests in the presence of Owner's Representative. Give 48 hours advance notice before commencement of each test.
 5. Test ductwork systems in sections as large as possible and record all test results according.
 6. Coordinate testing with ceiling installation.
 - a. Provide sheet-metal plates and install between each duct test section (applies to main-to-main fittings, branch-to-branch fittings and main-to-branch fittings). At each plate location, fabricate joint with Ductmate. Insert 14 gauge sheet metal between Ductmate using a neoprene gasket on both sides of metal plate.
 - b. Leave plates in place until isolated section has been tested and approved by Owner's Representative.

- c. Once sections have passed test, remove plates and reattach Ductmate joints. After fan unit is running, test joint for leakage by using a mixture of soap and water. If any noise or bubbling occurs, reseal joint. Owner's representative to witness this procedure.

3.03 MOUNTING FOR SIDEWALL GRILLES AND REGISTERS

- A. All mounting heights indicated on Drawings from finish floor to lower edge of grille or register. Exception: If note on Drawings states for example "Down 6 inches," this indicates measurement from ceiling to top edge of grille or register.
- B. Install all sidewall return air grilles for "sight-tight" visibility at eye level (position blades to obscure visibility from floor level).

3.04 GRILLE AND EXPOSED DUCT CLEANING

- A. After completion of ductwork installation, operate each fan system (excluding exhaust fans) for a minimum of 30 minutes prior to installation of ceiling grilles and diffusers. After grilles and diffusers are installed, clean out all accumulation of particles from grilles and diffusers prior to acceptance.
- B. Clean exterior surface of all ducts exposed to public view of chalk, pencil and pen marks, labels, sizing tags, dirt, dust, etc., so that upon completion of installation, ducts are left in clean and unblemished manufactured condition.
- C. All exposed duct and grilles shall remain free of dust entrained streaks due to leakage at joints and grille connections during warranty period. Clean leaks, seal and refinish to match existing if visible streaks develop.

END OF SECTION

SECTION 15910

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Work Included: Materials, installation, and testing of HVAC duct accessories such as volume dampers.

1.02 QUALITY ASSURANCE

- A. Provide fire dampers in conformance with the requirements of Fire Damper and Heat Stop Guide for Air Handling Systems, as published by SMACNA.

1.03 SUBMITTALS

- A. Submit manufacturer's catalog data and fabrication/installation drawings for each factory fabricated duct accessory.

PART 2 - PRODUCTS

2.01 DAMPERS

- A. Volume Dampers (VD):
 1. Construct of galvanized sheets not lighter than 18 gauge, reinforced to prevent vibration, equipped at both ends with brass bearing mounts and of sufficient length to provide a complete shutoff of the duct.
 2. Provide each damper with an adjustment and locking quadrant device manufactured by Young Regulator Co., No. 403 operator for accessible locations, or No. 315 for nonaccessible locations. Ventlock, or approved. Provide operating rod and attaching devices as required for No. 315 operator. Provide Young Regulator No. 443 or 443B raised platform for insulated duct.
- B. Register Dampers: Dampers utilized with grilles. Opposed blade dampers utilizing a side operated worm drive which provides external duct operation. Slot the end of the shaft to receive a screwdriver. Factory assembled side operator. Construct of the same material as the grille. Manufacturers: Same as grilles and diffusers. Provide Young Regulator 443 or 443B raised platform for insulated duct.

PART 3 - EXECUTION

3.01 VOLUME DAMPERS

- A. Provide in main duct branches where shown. Provide in branch ducts serving air inlets and outlets.
- B. Locate dampers as close to trunk or main branch as possible.

END OF SECTION

SECTION 15990

TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.01 SUMMARY

- A. Work Included: Materials, equipment and labor required for testing, adjusting, and balancing work required by this Section, including air, hydronic systems, and associated equipment and apparatus. The work consists of setting speed and volume (flow) adjustments, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.

1.02 SCOPE OF WORK

- A. Testing, adjusting, and Balancing (TAB) of the air conditioning systems and related ancillary equipment will be performed by a certified third party independent of the Contractor who specializes in testing, adjusting, and balancing of heating, ventilating, air-moving equipment and hydronic systems and has a minimum of 5 years experience in this specialty.
- B. Make changes or replacements to the sheaves, belts, dampers, valves, etc. required for the correct balance as advised the TAB Firm, at no additional cost to the Owner.
- C. The Drawings and Specifications indicate valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, and it will be the responsibility of the Contractor to install these devices in a manner that will leave them accessible and readily adjustable. Should any such device not be readily accessible, provide access as requested by the TAB Firm. Correct equipment malfunction encountered during the balancing process.
- D. Complete TAB services prior to Owner occupancy.

1.03 QUALIFICATIONS

- A. Perform work of this Section by a firm certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC).
- B. Do work of this Section under the direct supervision of a person who has passed written and practical NEBB or AABC examinations for testing, adjusting, and balancing of air and hydronic systems.

1.04 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NEBB Compliance: Comply with NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" as applicable to mechanical air and hydronic distribution systems, and associated equipment and apparatus; or comply with AABC's Manual MN-1, "AABC National Standards," as applicable to mechanical air and hydronic distribution systems, and associated equipment and apparatus.
 - 2. Industry Standards: Comply with ASHRAE recommendations pertaining to measurements, instruments, and testing, adjusting and balancing, except as otherwise indicated.
- B. Personnel: TAB personnel used on the project will be employees of the Test and Balance Agency. Perform TAB work under the direct supervision of the NEBB or AABC Certified Test and Balance Supervisor.
- C. Instrumentation:
 - 1. List in balance report instrument description, serial number, and date of calibration.

2. Use instruments calibrated no longer than 1 year prior to report submission.

1.05 SUBMITTALS

- A. Procedures: Submit certified test reports, signed by TAB supervisor who performed TAB work.
- B. Qualification Statements: Submit company's certification documents including Contractor Certification and Supervisor certification.
- C. Report Forms:
 1. Submit copies of report forms to Architect within 30 days of award of the Contract by Owner prior to commencement of testing and balancing work at the site.
 2. Provide 8-1/2- by 11-inch paper for looseleaf binding, with blanks for listing the required test ratings and for certification of report.
 3. Submit reports on forms similar in content to standard AABC or NEBB test forms.
 4. Submit final test and balance report. Include Record Drawings with terminal codes for cross-reference with the Submittal, such that terminals referenced in the Submittal are easily located on the Drawings.
 5. Include identification and types of instruments used, and their most recent calibration date.
 6. Submit resume data on person who is to directly supervise testing, adjusting and balancing work.
- D. Maintenance Data: Include copies of balancing report and identification of instruments in maintenance manuals.
- E. NEBB or AABC Certificate: At time of submittal of forms, submit NEBB or AABC certification form for review.

1.06 WARRANTY

- A. TAB Agency provides warranty for a period of 90 days following submission of completed report, during which time, Owner may request a recheck of up to 10 percent of total number of terminals, or resetting of any outlet, coil, or device listed in the final TAB report.
- B. Warranty shall meet the requirements of the following programs:
 1. AABC – National Project Performance Guarantee
 2. NEBB – Conformance Certification

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS

- A. Ductwork and Housings: Use plastic plugs with retainers to patch drilled holes.

2.02 INSTRUMENTS

- A. Utilize test instruments and equipment as recommended in the following:
 1. NEBB's Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
 2. AABC's Manual MN-1, "AABC National Standards."

PART 3 - EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Perform TAB work with doors, closed windows, and ceilings installed, etc., to obtain simulated or project operating conditions. Do not proceed until systems scheduled for testing, adjusting and balancing are clean and free from debris, dirt and discarded building materials.
- B. Verify the following:
 1. Equipment is operable and normal condition.
 2. Temperature control systems are installed complete and operable.

3. Final filters are clean and in place.
 4. Duct systems are clean of debris.
 5. Dampers are in place and open.
 6. Access doors are closed.
 7. Air outlets are installed and connected.
 8. Any conditions affecting system operation, such as open doors, adjacent pressurized areas, and the like, are in final operating conditions prior to testing and balancing.
- C. Report any defects or deficiencies noted during performance of services to Architect. Promptly report abnormal conditions in Mechanical Systems or conditions which prevent system balance.
- D. Automatic Temperature Control Systems:
1. Set and adjust automatically operated devices to achieve required sequence of operations. Coordinate with the automatic temperature control supplier. Do not proceed without his representation.
 2. Verify controls for proper calibration and correct as necessary.

3.02 TEST HOLE LOCATIONS

- A. Install test holes at the inlet and outlet of air handling unit fans, exhaust fans, utility fans, and the like, and elsewhere as required to facilitate traverses and to test the air systems. Plug holes when finished. Install test holes in air handlers to obtain test data for each component.

3.03 AIR SYSTEM PROCEDURE

- A. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- B. Measure air quantities at air inlets and outlets. Log shows each successive test.
- C. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- D. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

3.04 RETURN AIR TESTING

- A. Identification/location.
- B. Design airflow.
- C. Actual airflow.
- D. Design return airflow.
- E. Actual return airflow.

3.05 DUCT TRAVERSE TESTING

- A. System zone/branch.
- B. Duct size.
- C. Area.
- D. Design velocity.
- E. Design airflow.
- F. Test velocity.
- G. Test airflow.

- H. Duct static pressure.
- I. Air temperature.
- J. Air correction factor.

3.06 AIR DISTRIBUTION TESTING

- A. Air terminal number.
- B. Room number/location.
- C. Terminal type.
- D. Terminal size.
- E. Design velocity.
- F. Design airflow.
- G. Test (final) velocity.
- H. Test (final) airflow.
- I. Percent of design airflow.

3.07 ADJUSTING

- A. Recorded data represents actually measured or observed conditions. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops. Adjust air systems to deliver specified volumes with lowest possible fan speed.

END OF SECTION

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Electrical systems required for this work includes labor, materials, equipment, and services necessary to complete installation of electrical work shown on Drawings, specified herein or required for a complete operable facility and not specifically described in other Sections of these Specifications. Among the items required are:
 - a. Feeder to panels/HVAC equipment, Owner provided equipment and other equipment.
 - b. Branch circuit wiring from the panels for lighting, receptacles, motors, signal systems and other detailed circuit wiring.
 - c. Luminaires, control switches, receptacles, relays, supports and other accessory items.
 - d. Wiring and power connections for motors installed for heating, cooling and ventilation.
 - e. Fire alarm system.
- B. Products installed but not furnished under Division 16: Motor controllers, see Division 15.

1.02 DEFINITIONS

- A. Following is a list of abbreviations generally used in Division 16:
 - 1. ADA Americans With Disabilities Act
 - 2. AHJ Authority Having Jurisdiction
 - 3. ANSI American National Standards Institute
 - 4. APWA American Public Works Association
 - 5. ASTM American Society for Testing and Materials
 - 6. CBC California Building Code
 - 7. CEC California Electrical Code
 - 8. CFC California Fire Code
 - 9. FCC Federal Communications Commission
 - 10. HVAC Heating, Ventilating and Air Conditioning
 - 11. IEEE Institute of Electrical and Electronics Engineers.
 - 12. IETA International Electrical Testing Association
 - 13. FM FM Global
 - 14. OSHA Occupational Safety and Health Administration
 - 15. UL Underwriters Laboratories Inc.
- B. Provide: To furnish and install, complete and ready for the intended use.
- C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly and installation.
- D. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at the project site to complete items of work furnished by others.

1.03 ADDITIONAL REQUIREMENTS TO DIVISION 01

- A. Product Submittals and Shop Drawings:
 - 1. When requested by individual Sections provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.

2. Provide product submittals and shop drawings in two formats – electronic (PDF, or portable document format) and paper. Electronic format must be submitted on CD, DVD, portable flash drive, or via e-mail in a zip file. Provide one electronic file for each specification section. When documents are submitted via e-mail, copy architect on all transmissions.
- B. Operation and Maintenance Documentation: Provide copies of certificates of code authority acceptance, test data, product data, guarantees, warranties, and the like.
 - C. Shop Drawings: When requested by individual Sections provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.
 - D. Closeout Documentation: Submit electrical code authority certification of inspection. Include documentation of on-site electrical testing that was performed.
 - E. Record Drawings:
 1. Show changes and deviations from the Drawings. Include written Addendum and change order items.
 2. Show exact routes of feeders 100 amp and larger, cable tray, surface metal raceway, and conduits for signal systems 2 inches in diameter and larger..
 3. Show exact location of panelboards, safety disconnects, motor controllers, occupancy sensors, and the like.
 4. Make changes to drawings in electronic format. Obtain electronic copy from Architect, use the same version of AutoCAD to prepare record drawings as was used by the Architect. Provide electronic copy and hard copy to Architect for review.

1.04 QUALITY ASSURANCE

- A. Conform to the latest adopted version of the California Electric Code (CEC) with local amendments.
- B. Obtain and pay for electrical permits, plan review, and inspections from local AHJs.
- C. Furnish products listed by UL or other testing firm acceptable to AHJ.

1.05 SEQUENCING AND SCHEDULING

- A. For the proper execution of the work cooperate with other crafts and contracts as needed.
- B. To avoid installation conflicts, thoroughly examine the complete set of Contract Documents. Resolve conflicts with Architect prior to installation.
- C. Prior to installation of feeders to equipment requiring electrical connections, examine the manufacturer's shop drawings, wiring diagrams, product data, and installation instructions. Verify that the electrical characteristics detailed in the Contract Documents are consistent with the electrical characteristics of the actual equipment being installed. When inconsistencies occur request clarification from Architect.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide like items from one manufacturer, such as luminaire types, switches, receptacles, breakers, panels, and the like.

2.02 MATERIALS

- A. Provide new electrical materials of the type and quality detailed, listed by UL, bearing their label wherever standards have been established. Indicated brand names and catalog numbers are used to establish standards of performance and quality. The description of materials listed herein governs in the event that catalog numbers do not correspond to materials described herein.
- B. Provide material and equipment that is acceptable to AHJ as suitable for the use indicated. For example, provide wet labeled equipment in locations that are wet.
- C. Include special features, finishes, accessories, and other requirements as described in the Contract Documents regardless of the item's listed catalog number.
- D. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system, in a safe and satisfactory working condition.

2.03 FIRESTOPPING

- A. For additional requirements see Division 07 "Firestopping."
- B. Foam Sealant: Foam sealant for use around conduit penetrations to prevent passage of smoke, fire, toxic gas or water. Maintain seal before, during and after fire. In and around conduit for thermal break at penetration of barrier between heated and unheated spaces. Chase Technology Corporation, Fire Foam, Thomas & Betts, or approved.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Construction Documents:
 - 1. Drawings are diagrammatic with symbols representing electrical equipment, outlets, luminaires, and wiring.
 - 2. Electrical symbols indicating wiring and equipment shown in the Contract Documents are included in the Contract unless specifically noted otherwise.
 - 3. Examine the entire set of Drawings to avoid conflicts with other systems. Determine exact route and installation of electrical wiring and equipment with conditions of construction.
- B. Clarification:
 - 1. The Drawings govern in matters of quantity, the Specification in matters of quality. In event of conflict on Drawings or in the Specifications, the greater quantity and the higher quality apply.
 - 2. Should the Electrical Documents indicate a condition conflicting with the governing codes and regulations, refrain from installing that portion of the work until clarified by Architect.

3.02 INSTALLATION

- A. Install electrical equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of the electrical equipment, examine the instructions thoroughly. When requirements of the installation instructions conflict with the Contract Documents, request clarification from Architect prior to proceeding with the installation.
- B. Do not install electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.
- C. Noise Control:
 - 1. Do not install outlet boxes back to back. Do not use straight through boxes.
 - 2. Do not place contactors, transformers, starters and similar noise producing devices on walls which are common to occupied spaces unless specifically called for on Drawings.

Where such devices must be mounted on walls common to occupied spaces, mount or isolate in such a manner as to effectively prevent the transmission of their inherent noise to the occupied space.

- D. Firestopping:
 - 1. Coordinate with the Drawings the location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated by electrical equipment, seal around the equipment with approved firestopping material.
 - 2. Install firestopping material complete as directed per the manufacturer's installation instructions.

3.03 FIELD QUALITY CONTROL

- A. Tests:
 - 1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified in Division 16. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.
 - 2. During site evaluations by Architect, provide an electrician with tools to remove and replace trims, covers, devices, and the like, so that a proper evaluation of the installation can be performed.
 - 3. Testing shall include:
 - a. Occupant sensing automatic controls.
 - b. Automatic time and override controls for interior lighting.

3.04 CLEANING

- A. Remove dirt and debris caused by the execution of the electrical work.
- B. Leave the entire electrical system installed under this Contract in clean, dust-free and proper working order.
- C. Vacuum clean interiors of all new and modified electrical signal and communication equipment enclosures.

3.05 DEMOLITION

- A. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas. The Owner will cooperate to the best of their ability to assist in a coordinated schedule, but will remain the final authority as to time of work permitted.
- B. Examination: Determine the exact location of existing utilities and equipment before commencing work, compensate the Owner for damages caused by the failure to locate and preserve utilities. Replace damaged items with new material to match existing.
- C. Promptly notify Owner if utilities are found which are not shown on Drawings.
- D. Execution:
 - 1. Remove existing luminaires, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless shown as retained or relocated on Drawings.
 - 2. Maintain electrical continuity of existing systems. Remove or relocate electrical boxes, conduit, wiring, equipment, luminaires, and the like, as encountered in removed or remodeled areas in the existing construction affected by this work.
 - 3. Remove and restore wiring which serves usable existing outlets clear of the construction or demolition

4. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, provide new conduit and wire to bypass the abandoned outlets.
5. If existing conduits pass through partitions or ceiling which are being removed or remodeled, provide new conduit and wire to reroute clear of the construction or demolition and maintain service to the existing load.
6. Extend circuiting and devices in existing walls to be furred out.
7. Existing electrical outlets and luminaires are indicated on electrical demolition plans. Verify exact location and number of existing electrical outlets and luminaires in the field. Only partial existing electrical shown. Locations of items shown on Drawings as existing are partially based on Record and other Drawings which may contain errors. Verify the accuracy of the information shown prior to bidding and provide such labor and material as is necessary to accomplish the intent of the Contract Documents.
8. Remove abandoned wiring to leave site clean.
9. Existing lighting which is to remain or be relocated is to be relamped, reballasted and cleaned. Leave all luminaires in proper working order.
10. If existing electrical equipment contains PCBs (polychlorinated biphenyl), replace with new. Dispose of material containing PCBs as required by federal and local regulations.
11. Repair adjacent construction and finishes damaged during demolition work.
12. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

3.06 SALVAGED EQUIPMENT

- A. Salvage the following equipment not being reused and return to owner: Luminaires.
- B. Electrical equipment that cannot be salvaged for reuse sell/give to recycling company. Recycle the following excess, removed, or demolished electrical material:
 1. Copper or aluminum conductors, buses, motor/transformer windings, and the like.
 2. Steel and aluminum from raceways, boxes, enclosures, housings and the like.
 3. Acrylic and glass from luminaire lenses/refractors.
- C. Provide separate on-site storage space for recycled and salvaged material.

3.07 CONTINUITY OF SERVICE

- A. No interruption of services to any part of existing facilities will be permitted without express permission in each instance from the Owner. Requests for outages shall state the specific dates and hours and the maximum durations, with the outages kept to these specific dates and hours and the maximum durations. Obtain written permission from the Owner for any interruption of power, lighting or signal circuits and systems.
- B. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work, due to maintaining continuity of service herein required.
- C. Organize work to minimize duration of power interruption.

END OF SECTION

SECTION 16040

BUILDING LIGHTING ACCEPTANCE TESTING AND DOCUMENTATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This section describes the Acceptance Testing and documentation of the lighting system(s) and outlines the duties and responsibilities of the contracting team for Acceptance Testing.
- B. Supply the acceptance requirements to products, equipment and systems provided under this Division, where indicated on plans, and where required by California Title 24 requirements.
- C. Engage the services of a firm specializing in commissioning of lighting systems or shall submit contractor qualifications for review by architect where testing and documentation is to be performed by contractor.

1.02 THE COMMISSIONING TEAM

- A. Form the Commissioning Team of:
 - 1. Electrical contractor's representative
 - 2. Lighting controls manufacturer's representative
 - 3. Inspector of record
 - 4. Owner's staff representative

PART 2 - PRODUCTS

2.01 DUTIES OF THE TEAM

- A. The duties of the Team are as outlined in the Title 24 Requirements and summarized below:
 - 1. Plan, organize and implement the Acceptance Testing process and within 1 month of the award of the contract, submit the names and addresses of the Testing team member(s).
 - 2. The Acceptance testing team shall submit a complete description of the testing procedures and systems to be tested to the architect for review.
 - 3. The Acceptance testing team shall coordinate tests of systems and equipment and assemble documentation related to tests. Submit documentation relative to tests and proposed procedures to design engineer for review prior to submitting documentation to Authority having Jurisdiction (AHJ). Team responsible for performing data analysis, calculation of performance indices and crosschecking of results with the requirements of Title 24 and the Contract documents. The installing contractor or agent responsible for testing and documentation shall record their State of California Contractor's license number or their State of California Professional Registration License number on each Certificate of Acceptance for submittal.
 - 4. Responsible for submitting Certificate of Acceptance including paper and electronic copies of measurements and monitoring results and supporting documentation to the AHJ. Where AHJ questions results or requires additional testing, complete additional testing and provide required documentation at no additional cost to the Owner.

2.02 TIME SCHEDULE

- A. Determine the time period of the commissioning of the systems by the general contractor and Acceptance testing team. It is important to note that AHJ will not release a final Certificate of Occupancy until a Certificate of Acceptance is submitted that demonstrates that the specified systems and equipment have been shown to be performing in accordance with the Title 24 standards.

2.03 ACCEPTANCE TESTING – PHASE I - DOCUMENTATION

- A. Team shall assemble documentation showing lighting fixture locations, lighting control device locations, control sequences and notes.
- B. Per Title 24 requirements, team shall provide record drawings to building owner within 90 days of receiving a final occupancy permit (refer to other specification sections for requirements on record drawings.)
- C. Per Title 24 requirements, team shall provide operating and maintenance manuals to the building owner (refer to other specification sections for requirements on operation and maintenance manuals.)

2.04 ACCEPTANCE TESTING – PHASE II – INSPECTION AND TESTING

- A. Team shall review the installation, perform acceptance testing and document results for the following systems:
 - 1. Occupancy Sensors
 - 2. Manual Daylight Controls
 - 3. Automatic Daylight Controls
 - 4. Automatic Time Switch Controls
- B. Review of installation shall confirm lighting fixtures and lighting controls are properly located, identified, calibrated, and set points and schedules programmed per contract document requirements.

2.05 ACCEPTANCE TESTING - PHASE III - CERTIFICATION

- A. Team shall document operating and maintenance information, complete installation certificate, and indicate test results on the Certificate of Acceptance, and submit the Certificate to the AHJ prior to receiving final occupancy permit. Team shall submit forms LTG-1-A through LTG-3-A as required by Title 24 requirements.

PART 3 - EXECUTION

3.01 ACCEPTANCE TESTS AND DOCUMENTATION

- A. Refer to California Title 24, Non-residential manual for specific testing procedures and documentation requirements. The detailed requirements can be found at <http://www.energy.ca.gov/title24/2008standards/index.html>. Contractor is responsible for reviewing and complying with these standards

END OF SECTION

SECTION 16050

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Raceways.
 - 2. Wires, cables and connectors.
 - 3. Outlet boxes.
 - 4. Devices and plates.
 - 5. Safety disconnect switches.
 - 6. Identification.
 - 7. Surface raceway system.
 - 8. Power/signal poles.

1.02 SYSTEM DESCRIPTION

- A. Provide raceways, wires, cables, connector, boxes, devices, finish plates and the like for a complete and operational electrical system.
- B. Electrical Connections: Connect equipment, whether furnished by Owner or other Divisions of the Contract, electrically complete.
- C. Supporting Devices: Safety factor of 4 required for every fastening device or support for electrical equipment installed. Support to withstand four times weight of equipment it supports. Provide seismic bracing per CBC requirements for this building location.

1.03 SUBMITTALS

- A. Provide shop drawings and product data for the following:
 - 1. Raceways.
 - 2. Wires, cables and connectors.
 - 3. Outlet boxes.
 - 4. Devices and plates.
 - 5. Safety disconnect switches.
 - 6. Identification equipment.
 - 7. Surface raceway system.
 - 8. Power/signal poles.
- B. Provide the following operating and maintenance instructions from the manufacturer for project closeout, see project closeout requirements in Division 1:
 - 1. Devices and plates.
 - 2. Safety disconnect switches.
 - 3. Surface raceway system.
 - 4. Power/signal poles.

1.04 REGULATORY REQUIREMENTS

- A. Conform to the latest adopted version of the California Electric Code (CEC) with local amendments.
- B. Furnish products listed by UL or other testing firm acceptable to AHJ.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Wires and Cables: Carol, General Cable, Okonite, Southwire, or approved.

- B. Connectors: Stranded conductors by Anderson, Burndy, IlSCO, Thomas & Betts, or approved.
- C. Splices:
 - 1. Branch Circuit Splices: Ideal, Scotch-Lock, 3M, or approved.
 - 2. Feeder Splices: Compression barrel splice with two layers Scotch 23 and four layers of Scotch 33+ as vapor barrier.

2.02 RACEWAYS

- A. Conduits:
 - 1. Galvanized Rigid Steel Conduit (RMC): Hot-dip galvanized after thread cutting. Manufacture in conformance with ANSI C80.1.
 - 2. Electrical Metallic Tubing (EMT): Hot-dip galvanized and chromate coated. Manufacture in conformance with UL 797 and ANSI C80.3.
 - 3. Flexible Conduit (FMC): Reduced wall flexible steel conduit. Hot-dip galvanized. Manufacture in conformance with Federal Specification A-A-55810.
 - 4. Flexible Conduit, PVC Coated (LFMC): Hot-dip galvanized steel. PVC chemical resistant jacket extruded to core, up to 1-inch trade size. PVC chemical resistant jacket, tubed over core, up to 4-inch trade size.
- B. Surface Receptacle/Signal Raceway Systems:
 - 1. Single Channel Surface Raceway:
 - a. Power: Provide 20 amp multi-circuit raceway as indicated on drawings. Panduit T-70 System, Wiremold 3000 Series, or approved.
 - b. Signal: Blank cover with outlets as indicated on drawings. Panduit T-70 System, Wiremold 3000 Series, or approved.
 - 2. Two-Channel Surface Raceway: One channel for power, the other channel for signal. Provide 20 amp multi-circuit as indicated on drawings. Provide divider between channels. Panduit T-70 or TG-70 System, Wiremold 4000 Series, or approved.
 - 3. Provide lengths taken from drawings to a tolerance of 1/2 inch over raceway length between end wall surface. Do not scale from Division 16 Drawings.
 - 4. Provide prewired receptacles every 24 inches unless otherwise noted on drawings.
 - 5. Provide endcaps, corner joints, tees, transition fittings, and the like, for a complete installation.
 - 6. Verify exact mounting height with drawings.
 - 7. Finish: Off-White.
- C. Power/Signal Poles:
 - 1. Power and Communication Power Poles: 20 amp circuit on divided power and communication pole. Wiremold 30TP-B-412V (power/communication).
 - 2. Finish: Off-White.
- D. Conduit Fittings:
 - 1. Bushings: Malleable iron with plastic insulator lining, 150C rated.
 - 2. Ground Bushings: Malleable iron with plastic insulating liner and aluminum grounding lug rated for copper or aluminum conductor, 150C rated.
 - 3. EMT Connectors and Couplings:
 - a. Set Screw Type: Zinc plated steel, insulated throat connectors.
 - b. Compression Type: Zinc plated steel, insulated throat connectors, raintight up to 2 inches.
 - 4. Rigid Steel Conduit Ells: PVC coated or painted with No. 51 bitumastic material, long radius ells, minimum radius of 36 inches.
 - 5. Expansion/Deflection Fittings:
 - a. EMT: Use O-Z Gedney Type TX.
 - b. RMC: Use O-Z Gedney Type AX, DX and AXDX.

2.03 WIRES AND CABLES

- A. Copper, 600 volt rated throughout. Conductors 14AWG to 10AWG, solid or stranded. Conductors 8AWG and larger, stranded. Phase color to be consistent at feeder terminations; A-B-C, top to bottom, left to right, front to back. Conductors 3AWG and larger, minimum insulation rating of 75C. Insulation types THWN-2 or XHHW-2. Minimum insulation rating of 90C for branch circuits. Color code conductors as follows:

PHASE	208 VOLT WYE	240 VOLT DELTA	480 VOLT
A	Black	Black	Brown
B	Red	Orange (High Leg)	Orange
C	Blue	Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green
Isolated Ground	Green w/yellow trace	N/A	N/A

2.04 CONNECTORS

- A. Copper Pads: Drilled and tapped for multiple conductor terminals.
- B. Lugs: Compression type for use with stranded branch circuit or control conductors; mechanical lugs not acceptable. Manufacturers: Anderson, IlSCO, Panduit, Thomas & Betts, 3M, or approved.
- C. Conductor Branch Circuits: Wire nuts with integral spring connectors for conductors 18 through 8AWG. Push-in type connectors where conductors are not required to be twisted together are not acceptable. Manufacturers: 3M, Ideal, or approved.
- D. Fluorescent Luminaire Disconnect: polycarbonate housing, tin-plated brass contacts, insulated 18AWG, factory-installed solid copper leads, 105C temperature rating, UL94-V2 flammability, 4A, 600V. NEC Article 410 compliant. Finger-safe line side. Push-and-click connector. Thomas & Betts Sta-Kon, Lithonia or approved.

2.05 BOXES

- A. General:
1. Luminaire Outlet: 4-inch octagonal box, 1-1/2 inches deep with 3/8-inch luminaire stud if required. Provide raised covers on bracket outlets and on ceiling outlets.
 2. Device Outlet: Installation of one or two devices at common location, minimum 4 inches square, minimum 1-1/2 inches deep. One- or two-gang flush device raised covers. Bowers, Hubbell, or approved.
 3. Signal and Communication Systems Outlet: 4-inch square box, 2-1/8 inches deep. One- or two-gang raised device cover. Bowers, Hubbell, or approved.
 4. Multiple Devices: Three or more devices at common location. Install one-piece gang boxes with one-piece device cover. Install one device per gang. Bowers, Hubbell, or approved.
 5. Masonry Boxes: Outlets in concrete, Bowers, Hubbell, or approved.
 6. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

- B. Weatherproof Outlet Boxes: Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket, blank plugs and corrosionproof fasteners. Weatherproof boxes to be constructed to have smooth sides, gray finish. Bell, Carlon, Red Dot, or approved.
- C. Junction and Pull Boxes: Provide ANSI 49 gray enamel painted sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers. Circle AW, Hoffman, or approved.
- D. Box Extension Adapter: Die-cast aluminum construction. Install over flush wall outlet boxes to permit flexible raceway extension to equipment. Bell 940 Series, Carlon, Red Dot IHE4 Series, or approved.
- E. Conduit Fittings: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation. O-Z Gedney, Thomas & Betts, or approved.

2.06 WIRING DEVICES

- A. Wall Switches:
 - 1. Decorative AC Rocker Switch Characteristics: Quiet acting, 20 amp, 120/277 volt, UL listed for motor loads up to 80 percent of rated amperage. Hubbell, Leviton, Pass and Seymour.
 - 2. Finish: White.
- B. Wall Dimmers: Compatible with type or load controlled (i.e., electronic ballast, low voltage luminaire, and the like). Finish to match wall switches. Size dimmers to accept connected load. Do not cut fins. Where dimmers are ganged together, provide a single multi-gang coverplate. Leviton TN Series, Lutron NT Series, or approved.
- C. Receptacles:
 - 1. Finish: Same exposed finish as switches.
 - 2. Duplex Receptacle Characteristics: Straight parallel blade, 125 volt, 2 pole, 3 wire grounding: Decorative Type: Back and side wired. 20 amp. Cooper 6362, Hubbell DR20, Leviton 16362, Pass & Seymour 26852.
 - 3. Ground Fault Circuit Interrupter (GFCI) Receptacle: Meets or exceeds UL943 (Class A GFCI), UL498. Feed through type, back-and-side wired, tamper-resistant, weather resistant self-testing, 20 amp, 125VAC. Hubbell GFR5362SB, Cooper WRVGF20, Pass & Seymour 2095TRWR.
 - 4. UL Wet-Listed Covers While-In-Use: NEMA 3R when closed over energized plug. Vertical mount for duplex receptacle. Provide continuous use cover with cover capable of closing over energized cord cap with bottom aperture for cord exit. Die-cast aluminum cover with closed cell neoprene foam gasket. Intermatic WP1010MC.
- D. Finish Plates: Commercial grade thermoplastic, finish to match device finish.] [Molded nylon with same finish as devices.
- E. Surface Covers:
 - 1. Material: Galvanized or cadmium plated steel, 1/2-inch raised industrial type with openings appropriate for devices installed in surface outlets.
 - 2. Cast Box and Extension Adaptors: Aluminum, with gasket, blank. One gang, Bell 240-ALF, Carlon; two gang, Bell 236-ALF, Carlon, or approved.

2.07 SAFETY DISCONNECTS

- A. Toggle Type Disconnect Switches: 120 volt, 1 pole, 20 amp, 1 HP maximum. NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors.
- B. Manual Motor Starters: Quick-make, quick-break. Thermal overload protection. Device labeled with maximum voltage, current and horsepower. Eaton Electrical, General Electric, Siemens, Square D Class 2510, or approved. Provide NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors.
- C. Safety Switches: Heavy duty, fused type, dual rated, quick-make, quick-break with fuse rejection feature for use with Class R fuses only, unless other fuse type is specifically noted. Provide NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors. Switches clearly marked for maximum voltage, current and horsepower. Equip enclosure with defeatable cover interlock. Switches rated for maximum available fault current. Manufacturers: Eaton Electrical, General Electric, Siemens, Square D, or approved.

2.08 SUPPORTING DEVICES

- A. Hangers: Kindorf B-905-2A channel, H-119-D washer, C105 strap, 3/8-inch rod with ceiling flange.
- B. Concrete Inserts: Kindorf D-255, cast in concrete for support fasteners for loads up to 800 lbs.
- C. Pipe Straps: Two-hole galvanized or malleable iron.
- D. Luminaire Chain: Single jack chain No. 10, 40 lb. working load limit.

2.09 ELECTRICAL IDENTIFICATION

- A. Engraved Labels: Melamine plastic laminate, white with black core, 1/16 inch thick, manufactured by Lamicoid. Engravers standard letter style, minimum 3/16-inch high letters, capitals. Drill or punch labels for mechanical fastening except where adhesive mounting is necessary because of substrate. Use self-tapping stainless steel screws.
- B. Conductor Numbers: Manufacturers standard vinyl-cloth self-adhesive cable and conductor markers of the wraparound type. Preprinted black numbers on yellow field. Brady, Panduit, or approved.
- C. Branch Circuit Panel Schedules: Provide branch circuit identification schedules, typewritten, clearly filled out, to identify load connected to each circuit and location of load. Numbers to correspond to numbers assigned to each circuit breaker pole position.
- D. Relay Panel Schedule: Provide typewritten schedule to identify the incoming circuit, the controlled load, and the controlling devices for each relay.
- E. Circuit Breaker Identification: Provide permanent identification number in or on panelboard dead-front adjacent to each circuit breaker pole position.

PART 3 - EXECUTION

3.01 ELECTRICAL CHARACTERISTICS

- A. Verify electrical characteristics of equipment prior to installation of conduits and wiring for equipment. Coordinate HVAC voltage requirements with drawings and equipment submittals prior to rough in.

3.02 MOTOR BRANCH CIRCUIT WIRING

- A. Do not install electrical equipment or wiring on mechanical equipment without approval of Architect.

- B. Provide moisture tight equipment wiring and switches in ducts or plenums used for environmental air.
- C. Connect motor branch circuits complete from panel to motor as required by code and manner herein described.
- D. Motor starter, control devices and control wiring provided by other Divisions unless noted on drawings.

3.03 APPLIANCE/UTILIZATION EQUIPMENT

- A. Provide appropriate cable and cord cap for final connection unless equipment is provided with same. Verify special purpose outlet NEMA configuration and ampere rating with equipment supplier prior to ordering devices and coverplates.

3.04 INSTALLATION

- A. Conduit:
 1. Conduit Joints: Assemble conduits continuous and secure to boxes, panels, luminaires and equipment with fittings to maintain continuity. Provide watertight joints where embedded in concrete, below grade or in damp locations. Seal PVC conduit joints with solvent cement and metal conduit with metal thread primer. Rigid conduit connections to be threaded, clean and tight (metal to metal).
 2. Conduit Placement:
 - a. Install continuous conduit and raceways for electrical power wiring and signal systems wiring.
 - b. Conceal conduits. Exposed conduits are permitted only in the following areas:
 - 1) Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished materials.
 - 2) Existing walls that are concrete or block construction.
 - 3) Where specifically noted on the drawings.
 - c. Where exposed conduits are permitted install parallel or at right angles to building lines, tight to finished surfaces and neatly offset into boxes.
 - d. Do not install conduits or other electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.
 - e. Do not install conduits on surface of building exterior, across roof, on top of parapet walls, or across floors.
 - f. Route raceway at least 6 inches from hot surfaces above 120F, including noninsulated steam lines, heat ducts, and the like.
 3. Maximum Bends: Install code sized pull boxes to limit sum of bends in a run of conduit to 270 degrees.
 4. Flexible Conduit: Install 12-inch minimum slack loop on flexible metallic conduit and PVC coated flexible metallic conduit.
 5. Conduit Size: Size as indicated on drawings. Where size is not indicated, provide conduit in minimum code permitted size for THW conductors of quantity required for complete operation. Minimum trade size 3/4 inch.
 6. Provide pull cord in empty conduits that exceed 10 feet in length or the total sum of bends exceed 90 degree radius.
 7. Conduit Use Locations:
 - a. Wet Locations and Subject to Mechanical Damage: RMC.
 - b. Damp Locations and Locations Exposed to Rain: RMC and EMT up to 2 inches in diameter.
 - c. Dry, Protected: RMC and EMT.
 - d. Sharp Bends and Elbows: RMC, EMT use factory elbows.
 - e. Install pull wire or nylon cord in empty raceways provided for other systems. Secure wire or cord at each end.

- f. Elbow for Low Energy Signal Systems: Use long radius factory ells where linking sections of raceway for installation of signal cable.
 - g. Motors, recessed luminaires and equipment connections subject to movement or vibration, use flexible metallic conduit.
 - h. Motors and equipment connections subject to movement or vibration and subjected to any of the following conditions; exterior location, moist or humid atmosphere, water spray, oil or grease use PVC coated liquid tight flexible metallic conduit.
8. Branch Circuits: Do not change the intent of the branch circuits or controls without approval. Homeruns for 20 amp branch circuits may be combined to a maximum of six current carrying conductors in a homerun. Apply derating factors as required by CEC. Increase conductor size as needed.
 9. Feeders: Do not combine or change feeder runs.
 10. Unless otherwise indicated, provide raceway systems for conductors.
- B. Conduit Fittings:
1. Use set screw type fittings only in dry locations. When set screw fittings are utilized provide insulated continuous equipment ground conductor in conduit, from over current protection device to outlet.
 2. Use compression fittings in dry locations, damp and rain-exposed locations. Maximum size permitted in damp locations and locations exposed to rain is 2 inches in diameter.
 3. Use threaded type fittings in wet locations and damp or rain-exposed locations where conduit size is greater than 2 inches.
 4. Use insulated type bushings with ground provision at switchboards, panelboards, safety disconnect switches, junction boxes and the like that have feeders 60 amperes and greater.
 5. Provide bushing or EMT connector for conduits that do not terminate in box, enclosure, or the like.
 6. Provide conduit expansion fittings at building expansion joints and at locations where conduit is exposed to thermal expansion and contraction.
 7. Condulets and Conduit Bodies: Do not use condulets and conduit bodies in conduits for signal wiring.
- C. Surface Receptacle/Signal Raceway System: Install per manufacturer's installation instructions. Install perpendicular and parallel to building lines.
- D. Sleeves and Chases: Provide necessary rigid conduit sleeves, openings and chases where conduits or cables are required to pass through floors, ceiling or walls. Maintain integrity of fire-rated assemblies at penetrations of walls, ceilings or floors.
- E. Conductors, Wires and Cables:
1. Conductor Installation: Install conductors in raceways having adequate, code size cross-sectional area for wires indicated. Install conductors with care to avoid damage to insulation. Do not apply greater tension on conductors than recommended by manufacturer during installation. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation. Do not use pulling compounds for installation of conductors connected to GFCI circuit breakers or GFCI receptacles.
 2. Conductor Size and Quantity: Install no conductors smaller than 12AWG unless otherwise shown. Provide required conductors for a fully operable system.
 3. Provide dedicated neutrals (one neutral conductor for each phase conductor) in the following single phase circuits:
 - a. Dimmer controlled circuits.
 - b. Isolated ground circuits.
 - c. Ground fault protected circuits where a GFCI breaker is used in a panelboard.
 - d. Other electronic equipment that produces a high level of harmonic distortion including, but not limited to, computers, printers, plotters, copy machines, and fax machines.

4. Conductors in Cabinets: Hold conductors away from sharp metal edges. Cable and tree wires in panels and cabinets for power and control. Use plastic ties in panels and cabinets. Tie and bundle feeder conductors in wireways of panelboards.
 5. MC Cable is allowed for the following conditions. Installations not meeting these conditions will be removed and replaced at installer's own expense.
 - a. 20 and 30 amp branch circuiting where following conditions apply:
 - 1) Where there is a suspended ceiling with accessible space above (example: suspended acoustic ceiling tile).
 - 2) Do not use for homeruns from branch circuit to first device or luminaire in circuit.
 - 3) For drops to ceiling-mounted luminaires in areas with accessible ceiling space.
 - 4) Do not use in walls in areas where MC cable cannot be fished into the walls after construction is completed. For example: walls with glazing or solid beams overhead, partial height walls, etc.
- F. Connectors: Retighten lugs and connectors for conductors to equipment prior to Substantial Completion.
- G. Boxes:
1. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
 2. Round Boxes: Avoid using round boxes where conduit must enter through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface.
 3. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
 4. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.
 5. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.
 6. Outlet System: Provide electrical boxes and fittings as required for a complete installation. Include but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts, and other necessary components.
 7. Code Compliance: Comply with CEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to CEC, except as noted otherwise.
 8. Flush Outlets in Finished Spaces: Maintain integrity of insulation and vapor barrier. Surface outlets are only acceptable in areas with surface conduit.
 9. Mount center of outlet boxes as required by ADA, or noted on drawings, the following distance above the floor:
 - a. Control Switches: 46 inches.
 - b. Receptacles: 18 inches.
 - c. Other Outlets: As indicated in other Sections of Specifications or as detailed on drawings.
 10. Coordinate electrical device locations (switches, receptacles, and the like) with drawings to prevent mounting devices in mirrors, back splashes, behind cabinets, and the like.
- H. Wiring Devices:
1. Wall-Mounted Receptacles: Install with long dimension oriented vertically at centerline height shown on drawings or specified herein.
 2. Vertical Alignment: When more than one outlet is shown on drawings in close proximity to each other, but at different elevations, align the outlets on a common vertical center line for best appearance. Verify with Architect.

3. GFCI Outlets: One GFCI receptacle may be used to provide GFCI protection to downstream duplex receptacles on the same branch circuit provided the following conditions are met:
 - a. The downstream receptacles are in the same room as the upstream GFCI duplex receptacles, and
 - b. The downstream duplex receptacles are labeled as being protected by an upstream GFCI receptacle in the same room.

- I. Provide CEC-required disconnect switches whether specifically shown on drawings or not. Provide disconnect switch in sight of each motor location unless otherwise noted. Provide disconnect switch in site of each motor controller. Motor controller disconnect equipped with lock-out/tag-out padlock provisions do not require a disconnect switch at the controlled motor location. Coordinate fuse ampere rating with installed equipment. Fuse ampere rating variance between original design information and installed equipment, size in accordance with Busmann Fusetron 40C recommendations. Do not provide fuses of lower ampere rating than motor starter thermal units.

- J. Supporting Devices:
 1. Verify mounting height of luminaires or items prior to installation when heights are not detailed.
 2. Install vertical support members for equipment and luminaires, straight and parallel to building walls. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over furred or suspended ceilings.
 3. Do not use other trade's fastening devices as supporting means for electrical equipment, materials or luminaires. Do not use supports or fastening devices to support other than one particular item.
 4. Support conduits within 18 inches of outlets, boxes, panels, cabinets and deflections. Maximum distance between supports not to exceed 8 foot spacing.
 5. Securely suspend junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from the floor above or roof structure to prevent sagging and swaying.
 6. Provide seismic bracing per CBC requirements for this building location.

- K. Electrical Identification:
 1. Graphics: Coordinate names, abbreviations and designations used on drawings with equipment labels.
 2. Conductor Identification: Apply markers on each conductor for power, control, signaling and communications circuits.
 3. Install an engraved label on each major unit of electrical equipment indicating both equipment name and circuit serving equipment (e.g. "EF-1, CKT. 2P1-1,3,5), including but not limited to the following items: Disconnect switches, relays, contactors, time switches, override switches, service disconnects, distribution switches, branch circuit panelboards, and central or master unit of each electrical system including communication/signal systems.
 4. Install engraved labels on the inside of flush panels, visible when door is opened. Install label on outside of surface panel.
 5. Install signs at locations detailed or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment.
 6. On the back of receptacle and switch finish plates legibly write with indelible ink pen the circuit that each device is connected to.
 7. On the front of receptacle and switch finish plates provide label with the circuit that each device is connected to. Label is self-adhesive type with black letters and clear background, 18 point lettering size.

3.05 FIELD QUALITY CONTROL

- A. Wiring Device Tests: Test wiring devices to ensure electrical continuity of grounding connections, and after energizing circuitry, to demonstrate compliance with requirements. Test receptacles for line to neutral, line to ground and neutral to ground faults. Correct any defective wiring.
- B. Feeder Tests:
 - 1. Test conductor insulation on feeders of 100 amp and greater for conformity with +1000 volt megohmmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below. Notify Architect if insulation resistance is less than 1 megohm.
 - 2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmmeter test. Submit report with operating and maintenance manual.

END OF SECTION

SECTION 16400

PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Lighting and appliance branch panelboards.
 - 2. Overcurrent protection devices.
 - 3. Emergency lighting relay.

1.02 SUBMITTALS

- A. Provide Shop Drawings and Product Data for the Following Equipment:
 - 1. Lighting and appliance branch panelboards.
 - 2. Overcurrent protection devices.
 - 3. Emergency lighting relay.
- B. Provide operating and maintenance instructions from the manufacturer for project closeout, see Project Closeout Requirements in Division 1.
 - 1. Lighting and appliance branch panelboards.
 - 2. Overcurrent protection devices.
 - 3. Contactors.
 - 4. Emergency lighting relay.

1.03 REGULATORY REQUIREMENTS

- A. Conform to the latest adopted version of the California Electric Code (CEC), with local amendments.
- B. Furnish products listed by UL or other testing firm acceptable to AHJ.
- C. Conform to the requirement of the serving electric utility.

PART 2 - PRODUCTS

2.01 PANELBOARDS

- A. Enclosures:
 - 1. Flush Panelboards Rated 400 Amp or Less: Maximum enclosure depth, 5-3/4 inches.
 - 2. Wiring Gutter Size: 5 inches at sides, 6 inches top and bottom.
 - 3. Finish: Galvanized steel constructed in accordance with UL 50 requirements. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
 - 4. Hinged door with door-in-door construction, flush lift latch and lock, two keys per panel. Key panelboards alike.
- B. Interior:
 - 1. Copper bar with suitable electroplating (tin) for corrosion control at connection.
 - 2. Provide copper ground bar to accommodate specified terminal lugs.
 - 3. Predrill bus for bolt-on type circuit breakers.
 - 4. Provide double lugs or landing pads for feed through feeders.
 - 5. Provide feed through feeder lugs for field connection of multi-section flush panel sections, where applicable.
 - 6. When distribution panel is feeding isolated ground circuits, provide isolated ground bar, insulated from panelboard enclosure, to accommodate specified terminal lugs.
 - 7. Provide fully rated integrated equipment rating greater than the available fault current. Minimum rating is 14,000 amps.
 - 8. Lugs: Mechanical type rated for both aluminum and copper conductors.

9. Provide interior wiring diagram, neutral wiring diagram, UL listed label and short circuit current rating on the interior or in a booklet format inserted in a sleeve inside the panel cover.
- C. Main Circuit Breaker, Where Applicable: UL listed to accept solid or stranded, aluminum or copper conductors. Lugs suitable for 90C rated wire sized according to the 75C temperature rating per CEC.
- D. Branch Circuit Breakers:
1. Bolt-on type bus connectors. NEMA AB1. Common trip handle for poles. Do not use tandem circuit breakers.
 2. UL listed to accept solid or stranded, aluminum or copper conductors. Lugs suitable for 90C rated wire sized according to the 75C temperature rating per CEC.
 3. UL listed for use with the following factory installed accessories, as called out on Drawings: Shunt trip, arc-fault circuit interruption (AFCI), Class A ground fault circuit interruption (GFCI), auxiliary switch and alarm switch.
 4. UL listed with the following ratings:
 - a. 15 to 125 amp breakers: Heating, Air Conditioning, and Refrigeration (HACR) for HVAC equipment circuits.
 - b. 15 to 30 amp breakers: High Intensity Discharge (HID) lighting, where serving HID lighting.
 - c. 15 to 20 amp breakers: Switch Duty (SWD) for lighting circuits.
- E. Manufacturers: Square D, Eaton Electrical, General Electric, Siemens, or approved.

2.02 OVERCURRENT PROTECTION DEVICES

- A. Molded Case Circuit Breakers:
1. 1-, 2-, or 3-pole bolt-on, single-handle common trip, 600VAC or 250VAC as indicated on Drawings.
 2. Overcenter toggle-type mechanism, quick-make, quick-break action. Trip indication is by handle position.
 3. Calibrate for operation in 40C ambient temperature.
 4. 15 to 150 Amp Breakers: Permanent trip unit containing individual thermal and magnetic trip elements in each pole.
 5. Provide circuit breakers series rated when series combination ratings are applied, identify equipment enclosures.
 6. Manufacturers: Square D, Eaton Electrical, General Electric, Siemens, or approved.

2.03 COMBINATION STARTERS

- A. Heavy-duty, fused type, dual-rated, quick-make, quick-break with fuse rejection feature for use with Class R fuses only, unless other fuse type is specifically noted.
- B. Enclosures NEMA 1 indoors, NEMA 3R raintight outdoors.
- C. Clearly mark switches for maximum voltage, current and horsepower.
- D. Provide coil voltage coordinated with control requirements.
- E. Provide thermal overload units sized to equipment nameplate rating.
- F. Provide one N.C. and one N.O. auxiliary contacts.
- G. Provide prewired hand/off/auto switch and start button.

2.04 EMERGENCY LIGHTING RELAY

- A. UL924 listed for connected emergency load of 10 amps at 277 volt or 120 volt.
- B. UL rated N.C. contacts, minimum 10 amps rating.

- C. Allows emergency lighting to be switched in like manner as surrounding normal lighting when utility power is present, and then turns emergency lighting on automatically when utility power is lost. Operates as shunt device; transfer devices are not acceptable unless permitted by Engineer.
- D. Two separate status emergency lighting indicators for troubleshooting:
 - 1. LED indicates presence of normal utility power
 - 2. LED indicates presence of unswitched emergency power
- E. Manual test switch integral or remote to relay; also acceptable: automatic diagnostic testing feature.
- F. Manufacturers: Nine 24 BLTC-R, Wattstopper, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Raceway Grounding:
 - 1. Ground metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger grounding conductor is included with circuit, use grounding bushing with lay-in lug.
 - 2. Connect metal raceways, which terminate within an enclosure but without mechanical connection to the enclosure, by grounding bushings and ground wire to the grounding bus.
 - 3. Where equipment supply conductors are in flexible metallic conduit, install stranded copper equipment grounding conductor from outlet box to equipment frame.
 - 4. Install equipment grounding conductor, code size minimum unless noted on Drawings, in nonmetallic and metallic raceway systems.
- B. Feeders and Branch Circuits Grounding:
 - 1. Install continuous insulated equipment copper ground conductors within the following circuits; feeders, circuits for computer systems and other circuits as indicated on Drawings.
 - 2. Where installed in a continuous solid metallic raceway system and larger sizes are not detailed, provide insulated equipment ground conductors for feeders and branch circuits sized in accordance with Table 250-122.
- C. Boxes, Cabinets, Enclosures and Panelboards Grounding: Bond grounding conductors to enclosure with specified conductors and lugs. Install lugs only on thoroughly cleaned contact surfaces.
- D. Motors, Equipment and Appliance Grounding: Install code size equipment grounding conductor from outlet box to (motor) equipment frame or manufacturer's designated ground terminal.
- E. Receptacle Grounding: Connect ground terminal of receptacle to equipment ground system by No. 14 conductor bolted to outlet box except isolated grounds where noted. Self-grounding nature of receptacle devices does not eliminate conductor bolted to outlet box.
- F. Panelboards:
 - 1. Install panelboards as directed by manufacturer's installation instructions.
 - 2. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
 - 3. Install panelboards surface or flush mounted in accessible locations as indicated on drawings. Maintain or exceed minimum clearances required by code.
 - 4. Where flush panels are installed, verify available recessing depth and coordinate wall framing with other divisions.

5. Feeder conductors to enter directly in line with lug terminals wherever practicable. Feeder conductors, except ground and neutral, not to exceed 45 degree deflection from raceway entry to feeder phase lugs.
 6. Surface panels to have metal trim covers with no sharp edges or corners. Surface panel enclosure finish to match trim cover.
 7. Where two or more panels are installed side-by-side, provide covers of same height with each trim independently removable without disturbing the other sections.
 8. Provision for Future: Where provision for "future" or "space" is noted on Drawings, equip the space with bus connections to the future overcurrent device with suitable insulation and bracing to maintain proper short circuit rating and physical clearance. Provide buses for the ampere rating as shown for the future device.
- G. Overcurrent Protection Devices:
1. Provide testing of ground fault interrupting breakers.
 2. Provide a handle tie to branch circuit breakers of multiwire branch circuits for simultaneous disconnection of circuits. The handle tie will be identified for use with the circuit breakers provided. Reconfigure assigned circuits as necessary so that circuit breakers associated with multiwire branch circuits are physically adjacent; record changes in panelboard schedules for as-built drawings.
- H. Contactors:
1. Provide vibration isolation mounting pads for electrically held contactors installed within or on walls which are common to occupied spaces. Isolate terminals and operating mechanisms from enclosure.
 2. Install contactors and relays to reduce noise such that it will not create a disturbance or distraction in the areas in which such equipment is located.
- I. Control Devices: Install time switches and other automatic control devices in accessible locations near the source of power or grouped at a common location in mechanical rooms or similar spaces.
- J. Emergency Relay (UL924):
1. Provide unswitched emergency circuit, and unswitched and switched normal circuit to UL924 relay for control of emergency luminaires with remaining room luminaires on normal power.
 2. Install each relay within dedicated 4-11/16-inch junction box with double-gang plaster ring for wall or ceiling flush-mount as indicated on Drawings. Where location in ceiling would interfere with removal of ceiling tiles, install relay flush-mounted in nearest wall at ceiling level. Do not locate behind wall switch.

3.02 CLEANING

- A. Thoroughly clean the exterior and the interior of each switchboard and distribution panelboard in accordance with manufacturer's installation instructions.
- B. Vacuum construction dust, dirt and debris out of each switchboard and distribution panelboard.
- C. Where enclosure finish is damaged, touch up finish with matching paint in accordance with manufacturer's specifications and installation instructions.

3.03 TESTING

- A. Test to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved drawings and specifications.
 1. Daylight sensing automatic lighting controls.
 2. Occupant sensing automatic lighting controls.
 3. Automatic time switches for lighting control.

- B. Functionally test sequences of operation to ensure operation in accordance with approved drawings and specifications.
- C. Prepare and complete report of test procedures and results and file with the Owner.

END OF SECTION

SECTION 16500

LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Luminaires and lampholders.
 - 2. Ballasts and power supplies.
 - 3. Lamps.
 - 4. Emergency lighting equipment.

1.02 SUBMITTALS

- A. Submit for:
 - 1. Luminaires: Include electrical ratings, dimensions, mounting, material, required clearances, terminations, wiring and connection diagrams, photometric data, diffusers, and louvers.
 - 2. Ballasts and power supplies.
 - 3. Lamps.
 - 4. Emergency lighting equipment.
- B. Submittal Cutsheets: Highlight, circle or otherwise indicate graphically indicate which option(s) are being selected for the products submitted. Cutsheets that are not edited to indicate which products are submitted for this project or that list only catalog numbers to identify submitted options are not acceptable.
- C. Specified manufacturers are approved to submit bid. However, inclusion does not relieve manufacturer from supplying product as described.
- D. Provide the following operating and maintenance instructions from the manufacturer for project closeout, see Project Closeout Requirements in Division 1:
 - 1. Luminaires.
 - 2. Ballasts and power supplies.
 - 3. Lamps.
 - 4. Emergency lighting equipment.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Provide luminaires acceptable to code authority for application and location as indicated.
 - 2. Comply with applicable ANSI standards pertaining to lamp materials, lamp ballasts and transformers, and luminaires.
 - 3. Comply with applicable NEMA standards pertaining to lighting equipment.
 - 4. Provide luminaires and lampholders which comply with UL standards and have been listed and labeled for location and use indicated by a testing agency acceptable by the AHJ (e.g. UL, ETL, and the like).
 - 5. Comply with CEC as applicable to installation and construction of luminaires.
 - 6. Comply with fallout and retention requirements of CBC for diffusers, baffles, louvers, and the like.
 - 7. Provide same type lamps and ballasts from same manufacturer (e.g. fluorescent lamps from Osram/Sylvania, MR lamps from Ushio, and the like).

1.04 WARRANTY

- A. Ballast Manufacturer's Warranty: Not less than 2 years for magnetic type ballasts and 5 years for electronic type ballasts, based on date of substantial completion. Warranty includes normal cost of labor for replacement of ballast.
- B. Linear T8 and T5 Lamp and Ballast Combination Warranty: Provide ballast and lamp combinations which will result in written factory warranty covering lamps for 3 years and ballasts for 5 years, based on date of substantial completion.
- C. Lamp Warranty: 30 days for incandescent, 12 months for compact fluorescent, 36 months for fluorescent and 12 months for HID lamps, based on date of substantial completion.
- D. Induction: 5 years for the lamp and ballast.

1.05 MAINTENANCE

- A. Furnish 2 percent extra lens or louvers for each size and type of fluorescent luminaire.
- B. Furnish 10 percent extra lamps for each size and type installed.
- C. Furnish 5 percent extra ballasts for each size and type.

PART 2 - PRODUCTS

2.01 LUMINAIRES

- A. Luminaires: Refer to description and manufacturers in Luminaire schedule.
- B. Where recessed luminaires are installed in cavities intended to be insulated, provide IC rated luminaires or other code approved installation.
- C. UL label luminaires installed under canopies, roof or open porches, and similar damp or wet locations, as suitable for damp or wet locations.
- D. Suspended luminaires: provide 24 inch adjustability in aircraft cable length where used.
- E. Recessed Luminaires: Frame compatible with ceiling material installed at particular luminaire location. Provide proper factory trim and frame for luminaire to fit location and ceiling material.
- F. Finishes:
 - 1. Manufacturer's standard finish (unless otherwise indicated) over a corrosion resistant primer.
 - 2. Interior Light Reflecting Finishes: White or specular finish with not less than 85 percent reflectances.
 - 3. Exterior Finishes: As detailed in luminaire schedule or on Drawings. Refer cases of uncertain applicability to Architect for resolution prior to release for fabrication.
- G. Light Transmitting Components:
 - 1. Plastic diffusers, molded or extruded of 100 percent virgin acrylic.
 - 2. Prismatic acrylic, extruded, flat diffusers, 0.125 inch overall thickness, unless otherwise noted.
- H. Fluorescent Luminaires:
 - 1. Provide open lamp fluorescent luminaires without diffusers or guards with turret type, spring loaded sockets.
 - 2. Provide wire lamp guards on exposed lamp fluorescent luminaires.

2.02 BALLASTS AND POWER SUPPLIES

- A. General:
 - 1. Provide ballasts UL rated for specified lamps.

2. Thermal Protection: Internal UL Class 'P' with automatic reset.
 3. Sound Ratings: Class 'A'. Where not available as standard product from any specified manufacturer, provide quietest rating available.
 4. Total Harmonic Distortion: Not to exceed 20 percent of the input current unless otherwise indicated.
 5. Input Voltage: Provide universal voltage ballast matching branch circuit supply voltage, with minimum +/- 10 percent variation tolerance.
 6. Provide quantity of ballasts to provide switching as indicated on Drawings.
 7. Provide factory printed wiring diagram on ballast housing.
 8. Ballasts used in enclosed and gasketed luminaires shall be of Type 1 construction.
 9. Comply with FCC rules and regulations Part 18, Class A concerning generation of both electromagnetic interference and radio frequency interference.
- B. Ballasts for Linear Fluorescent Lamps:
1. Power Factor: Minimum 97 percent.
 2. Do not provide magnetic fluorescent ballasts.
 3. Linear T8 ballasts: Anti-striation circuitry, and UL type CC rated for arc protection. Compliant with NEMA/CEE high performance T8 lighting system specifications and listed with NEMA Premium Electronic Ballast program.
 4. Nondimming Electronic:
 - a. Tandem wiring between luminaires may be used to minimize the number of ballasts while accomplishing the switching requirements shown on Drawings. Provide label in lamp compartment of luminaire to identify the function of ballast. Label shall not be visible from room.
 - b. Provide ballasts that meet requirements of UL 935, ANSI C82.11 and bear the appropriate UL label.
 - c. Provide ballasts that withstand input power line transients as defined in ANSI C62.41, Category-A and IEEE 587.
 - d. Lamp Crest Factor: Maximum 1.7 for programmed rapid start ballasts and maximum 1.85 or less for instant start ballasts.
 - e. Average Ballast Factor (BF): Minimum 88 percent or as indicated in the luminaire schedule.
 - f. Provide 0 degree Fahrenheit minimum starting temperature ballasts for luminaires installed where exposed to anticipated ambient temperature less than 55F.
 - g. Manufacturers for Ballasts for T8 lamps: Philips Optanium Series, Universal Lighting Technologies Accustart Series, Osram/Sylvania Quicktronic Series, or approved.
 - h. Manufacturers for Ballasts for T5 and T5HO lamps: Philips Centium Series, Universal Lighting Technologies Accustart Series, Osram/Sylvania Quicktronic Series, or approved.

2.03 LAMPS

- A. Provide lamps for luminaires.
- B. Provide lamp cataloged for specified luminaire type.
- C. Provide similar lamps by a common manufacturer unless indicated in the luminaire schedule.
- D. Manufacturers: Osram/Sylvania, General Electric, Philips, Venture, or approved unless specific manufacturer is indicated in the luminaire schedule.
- E. Incandescent: Not allowed unless noted in luminaire schedule.
- F. Fluorescent:
 1. Provide 3500K fluorescent lamps unless noted in luminaire schedule.
 2. Linear Fluorescent:
 - a. T-8: Provide the following:
 - 1) Bi-pin base, tri-phosphor coated

- 2) Initial 3100 lumen output.
- 3) CRI equal to or exceeding 85.
- 4) 36000 hours rated on 3 hour switching cycle and 42000 hours rated on 12 hour switching cycles when used with programmed start ballast.
- 5) Compatible with dimming ballasts.
- 6) Length and wattage as indicated in the luminaire schedule.

2.04 EMERGENCY FLUORESCENT LAMP POWER SUPPLY

- A. Description: Self-contained, nickel-cadmium based, battery-operated power supply for operating one linear or compact fluorescent lamp for a minimum output of 90 minutes.
- B. Minimum initial lumen output for linear fluorescent lamps: 1350.
- C. Provide access hatches for emergency battery backup ballasts, adjacent to recessed 6-inch or less diameter downlights installed in inaccessible ceilings.
- D. Manufacturers: Bodine, Iota, Lithonia.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Coordination of Conditions: Coordinate ceiling construction, recessing depth and other construction details prior to ordering luminaires for shipment. Refer cases of uncertain applicability to Architect for resolution prior to release of luminaires for shipment. Where luminaires supplied do not match ceiling construction, replace luminaires at no cost to Owner.
- B. Electrical drawings are schematic, identifying quantity and type of luminaires used and their approximate location, but are not to be used for dimensional purposes. Refer to architectural drawings for exact locations, including mounting heights.
- C. Provide fluorescent and luminaires with ballast compatible to lighting control system as shown in drawings and specifications.

3.02 INSTALLATION

- A. Install luminaire of types indicated where shown and at indicated heights in accordance with manufacturer's written instructions and with recognized industry practices to ensure that luminaires comply with requirements and serve intended purposes.
- B. Align, mount and level luminaires uniformly. Use ball hangers for suspended stem mounted luminaires.
- C. Avoid interference with and provide clearance for equipment. Where indicated locations for luminaires conflict with locations for equipment, change locations for luminaire by minimum distance necessary as directed by Architect.
- D. Suspended Luminaires: Mounting heights indicate clearances between bottom of luminaire and finished floors.
- E. Egress Luminaires: Provide unswitched emergency circuit to exit signs and emergency luminaires.
- F. Interior Luminaire Supports:
 1. Support Luminaires: Anchor supports to structural slab or to structural members within a partition, or above a suspended ceiling.
 2. Maintain luminaire positions after cleaning and relamping.
 3. Support luminaires without causing ceiling or partition to deflect.
 4. Provide recessed fluorescent luminaires with four supports as required by DSA.

G. Wiring:

1. Recessed luminaires to be installed using flexible metallic conduit with luminaire conductors to branch circuit conductors in a nearby accessible junction box over ceiling. Junction box fastened to a building structural member within 6 feet of luminaire.
2. Install luminaires for lift out and removal from ceiling pattern without disconnecting conductors or defacing ceiling materials.
3. Flexible connections to exposed luminaires is not permitted.
4. Install junction box, flexible conduit and high temperature insulated conductors for through wiring of recessed luminaires.
5. Unit Battery Equipment in Egress Luminaires: Provide unswitched conductor to each egress luminaire from serving circuit. This is for the transfer electronics to determine when power has actually been lost.
6. Provide unswitched conductor to exit signs.

H. Relamp luminaires which have failed lamps at completion of work.

3.03 ADJUSTING

- A. Align luminaires that are not straight and parallel/perpendicular to structure.

3.04 CLEANING

- A. Clean paint splatters, dirt, dust, fingerprints, and debris from luminaires.
- B. Where finish of luminaires has been damaged, touch up finish as directed by manufacturer's instructions.

END OF SECTION

SECTION 16906

OCCUPANCY SENSORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Occupancy sensors.
 - 2. Combined occupancy sensor/wall switches ("sensor/switches").

1.02 SYSTEM DESCRIPTION

- A. Provide occupancy sensors to sense the presence of human activity within the desired space and enable or disable the on/off manual lighting control function provided by local switches.
- B. Upon detection of human activity by the detector, sensor initiates a time delay to maintain the lights on for a preset period of time. Field adjustable time delay setting from 30 seconds to 15 minutes.
- C. Factory set sensors for maximum sensitivity.
- D. LED lamp built into sensor indicates when occupant is detected.
- E. Provide zero cross relay control with sensors and sensor/switches; relay contacts close and open when AC voltage signal is at zero.
- F. Where line voltage sensors and sensor/switches are used, provide to match voltage of controlled circuit.
- G. Line Voltage Sensors, Control Units, and Relays: UL listed.
- H. Basis of Design: Occupancy sensor layout on Drawings are designed based on Wattstopper product line. Approved manufacturers listed below are allowed on condition of meeting the specified conditions including complete sensor coverage of the area controlled and switching of luminaires in the area controlled. Provide additional sensors and power switch packs as needed to provide the same level of functionality as shown on Drawings. Remove and replace electrical equipment installed not meeting these conditions at no cost to Owner.

1.03 SUBMITTALS

- A. Provide, on reproducible architectural floor plan, a layout of sensors indicating their sensing distribution.
- B. Provide wiring diagrams indicating low voltage and line voltage wiring requirements.

PART 2 - PRODUCTS

2.01 OCCUPANCY SENSORS

- A. Passive Infrared Sensors:
 - 1. Sensor Function: Detects human presence in the floor area being controlled by detecting changes in the Infrared energy. Sensor detects small movements, i.e., when a person is writing while seated at a desk.
 - 2. Provide a temperature compensated dual element pyro-electric sensor and with multielement Fresnel lens.
 - 3. Sensor utilizes DIP switches for adjustment to time delay and override. Field adjustable settings for sensitivity.
 - 4. Provide a daylight filter to ensure that the sensor is insensitive to short-wavelength infrared waves, i.e., those emitted by the sun.

5. Conceal adjustments and mounting hardware under a removable cover to prevent tampering with adjustments and hardware.
 6. Sensor utilizes advanced digital signal processing technology to reduce false offs without reducing sensitivity.
 7. Ceiling-Mounted Sensor:
 - a. 360 degree sensor range; coverage: 1200 square feet, unless otherwise noted on Drawings.
 - b. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.
 - c. Provide internal form C dry contacts for HVAC control.
 - d. Manufacturers: Watt Stopper CI-300 Series, Leviton, Hubbell or approved.
- B. Ultrasonic Occupancy Sensors:
1. Sensor Function: Detects human presence in the controlled floor area by detecting Doppler shifts in 40kHz ultrasound created by sensor.
 2. Sensors are precision crystal controlled and do not interfere with each other when two or more are placed in the same area. Sensor includes advanced digital signal processing to reduce false on signals without decreasing sensitivity, as well as immunity to RFI/EMI sources.
 3. Depluggable terminal for plug-and-play replacement.
 4. Sensor utilizes DIP switches for adjustment to time delay and override. Field adjustable settings for sensitivity.
 5. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.
 6. Ceiling-Mounted Sensor:
 - a. Maximum protrusion of 1.1 inches and blend in aesthetically with the ceiling.
 - b. Coverage: 360 degree sensor range; coverage: 2,000 square feet, unless otherwise noted on Drawings.
 - c. Provide internal form C dry contacts for HVAC control.
 - d. Manufacturers: The Watt Stopper UT Series, Leviton, Hubbell or approved.
 7. Ceiling Mounted Sensor – Hallway Sensor Coverage:
 - a. Maximum protrusion of 1.5 inches and blend in aesthetically with the ceiling.
 - b. Coverage: 90 lineal feet
 - c. Provide internal form C dry contacts for HVAC control.
 - d. Manufacturers: The Watt Stopper WT-2250 Series, Leviton, Hubbell or approved.
- C. Dual Technology Sensors:
1. General: Sensor has combined capability of passive infrared and ultrasonic sensors as described above.
 2. Function: Upon a person entering a space, motion must be sensed by both technologies before lighting will be turned on. After this has occurred, detection by either technology will hold lighting on for the set time period. Sensor shall have a retrigger time delay where only one motion is necessary to turn on the lights within 5 seconds after turning off.
 3. Ceiling-Mounted Sensor:
 - a. 360 degree sensor range; coverage: 1000 square feet for half-step motion, unless otherwise noted on Drawings.
 - b. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.
 - c. Provide internal form C dry contacts for HVAC control.
 4. Manufacturers: Watt Stopper DT-300 Series, Leviton, Hubbell or approved.

2.02 COMBINED OCCUPANCY SENSOR/WALL SWITCHES ("SENSOR/SWITCHES")

- A. Completely self-contained sensor system that fits into a standard single gang box. Internal transformer power supply, latching dry contact relay switching mechanism compatible with electronic ballasts, compact fluorescent, and inductive loads. Triac and other harmonic generating devices are not allowed.
- B. Passive infrared sensor technology includes advanced signal processing to reduce false triggers without increasing sensitivity. LED indicator blinks when occupant sensed.
- C. Rated to switch loads: 800 watts incandescent or 120-volt ballast; 1000 watts 277 volt ballast. Zero-crossing technology switches lighting off when AC voltage is at zero, minimizes contact wear.
- D. Provide adjustable daylight feature that holds lighting "off" when a desired footcandle level is present.
- E. Provide integral off override switch with no leakage current to the load or ground.
- F. Vandal-resistant lens.
- G. Finish: White finish unless selected otherwise by Architect.
- H. Alerts for impending shut-off: light flash, audible, both or none.
- I. Standard Sensor/Switch:
 - 1. 180 degree sensor range; coverage: 150 square feet for desktop activity.
 - 2. Manufacturers: The Watt Stopper PW-100 Series, Leviton, Hubbell or approved.
- J. Dual Relay Sensor/Switch:
 - 1. Dual auto-off buttons on face of switch allow end-user to turn off two switch legs in room space. Built-in light adjustable level sensor only turns off second of two relays when desired footcandle level is present. Otherwise similar to specifications above for single-zone sensor/switch.
 - 2. 180 degree sensor range; coverage: 150 square feet for desktop activity.
 - 3. Finish: White finish unless selected otherwise by Architect.
 - 4. Manufacturers: Watt Stopper PW-200 Series, Leviton, Hubbell or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install occupancy sensors as directed by manufacturer's instructions. Provide connections to control circuits, occupancy sensors, power supply pack and low voltage wiring.
- B. Drawings were laid out using Watt Stopper sensors as the basis of design. If another manufacturer is approved for installation under this Contract, verify with manufacturer representative that sensors are laid out to provide coverage across room space, adding additional sensors as needed.
- C. Provide power packs for the sensor to control the number of circuits and/or switch legs within its area of coverage.
- D. Field adjust each sensor to maximize its coverage of the room space.
- E. Relocate sensors with ultrasonic technology to avoid being closer to HVAC diffusers and power packs than recommended by manufacturer.
- F. Field set time delay for each device as noted below:
 - 1. Classrooms and Conference Rooms: 30 minutes
 - 2. Restrooms: 15 minutes

3. Storage Rooms, Janitor's Closets, Unisex Restrooms: 5 minutes
4. All Other Spaces: 15 minutes.

3.02 QUALITY CONTROL

- A. Use manufacturer's published testing and adjusting procedures to adjust sensors time delay, daylight sensitivity, and passive infrared sensitivity to satisfaction of the Owner.

END OF SECTION

**SECTION 17730
COMMUNICATIONS**

PART 1 GENERAL

1.01 STANDARD REQUIREMENTS

- A. The General Conditions referred to in the contract documents, together with Division 17, are part of the contract and shall apply to all work under the contract.
- B. All articles or parts of articles of the General Requirements or the Electrical General Conditions not amended, modified or supplemented by Division 17, shall remain in force and effect. Should any discrepancy become apparent between the General Requirements or the Electrical General Conditions and Division 17, the contractor shall notify the Architect in writing, and the Architect shall interpret and decide such matters.
- C. This section covers the telecommunications cabling system work to be performed primarily at the Los Medanos Campus Complex Building.
- D. Provide items indicated on the drawings and items and work called for in Division 17. This includes all incidentals, equipment, appliances, services, hoisting, scaffolding, supports, tools, supervision, labor, consumable items, fees, licenses, etc. necessary to provide a complete cabling system as described herein.
- E. It is the intent of the project documents to provide a communications cabling system. Any item not specifically addressed in the project documents but which is normally required for a complete communications cabling system is to be considered a part of the contract.
- F. Submit shop drawings, samples, requests for information (RFI) or other submittals to the Architect.

1.02 DEFINITIONS:

- A. WAO: Work area outlet complete with cabling, fittings, modular connectors, termination equipment, line cords, equipment cords, and cable supports, labeling, testing, and other items necessary or required in connection with such work
- B. IDF/TR: Elec 2802

1.03 WORK INCLUDED

- A. The scope of this work includes the following:
 - 1. Cable management devices
 - 2. Labeling of equipment, infrastructure, and cabling
 - 3. Firestopping conduits, sleeves, and penetrations used or provided for the use of communications
 - 4. Installing data cabling, faceplates, termination hardware, and backboards
 - 5. Testing of cabling installed as part of work

1.04 RELATED WORK

- A. 17730 - Communications
- B. 17732 - Communication Equipment Room Fittings
- C. 17731 - Pathways for Communications Systems

D. 17735 - Identification for Communications Systems

E. 17740 - Structured Cabling

1.05 QUALITY ASSURANCE

A. Provide only materials bearing the UL label, provided a standard has been established for the material

B. Provide only products and materials that are new, clean, and free of defects

1.06 SUBMITTALS

A. Test instrument documentation: Category 6 Level IIIe tester. Submit model number, serial number, manufacturer, firmware update, and copy of the most recent calibration certificate. Fluke or equal

B. List of materials proposed for this work. If catalog cut sheets are used, indicate which product on the catalog sheet is proposed. Cut sheet shall include technical information about the product(s) if manufacturer and part number is other than is specified.

C. Samples:

1. Faceplate (WAO) complete with two blue connectors, one white connector, blank, labeling, 4-foot cable whips showing required labeling and the manufacturer's cable markings. Components to be of the type and color that will be installed as part of this Work.

2. Tester output for permanent link

D. Jack table matrix (see Section 17735)

E. Submit five copies of submittals arranged by paragraph and specification number.

F. Coordinate submittal preparation with construction activities, purchasing, fabrication, and other submittals.

G. Submit scaled shop drawings where conditions exist or are reflected on documents where there is conflict or conditions will not permit the construction as shown in contract documents. Provide recommended solution when feasible. Do not proceed with work until reviewed and approved by the Architect.

1.07 WARRANTY

A. Installing contractor must be an ADC TrueNet[®] integrator and provide the District with an ADC 20 year TrueNet[®] System warranty for the cabling system

1. Contractor shall warrant that materials and equipment furnished under the contract are in good working order, free from defects, and conformance to system specifications. Contractor shall agree to repair, adjust and/or replace (as determined by the District to be in its best interest) any defective equipment, materials or other parts of the system at the Contractor's cost.

2. Installed equipment must conform to the manufacturer's official published specifications.

3. The ADC warranty shall begin at the system acceptance date and remain in effect for a period of twenty (20) years from that date. The District will incur no costs for service or replacement of parts during the 20 year warranty period. All third party warranties shall be passed through from Contractor to the District.

4. Contractor shall warrant that the system will function as specified in ADC's Technical Description Guide.

1.08 COORDINATION OF THE WORK

- A. Check space requirements with other trades and the physical confines of the area of work to ensure that material can be installed in the spaces allotted. Make modifications to the work as required and approved by the Architect.
- B. Transmit to other trades in timely manner information required for work to be provided under other sections. Where such needs are known in advance, transmit requirements two weeks prior to the time it is needed for installation or fabrication.
- C. Wherever work interconnects or interacts with the work of other trades, coordinate with other trades to ensure that trades have the information necessary so that they may properly install the necessary connections and equipment.
- D. Coordination with other trades and show coordination of work on shop drawing submittals (refer to paragraph 1.06G)
- E. Attend construction meetings as required to coordinate this work

1.09 CODES, REGULATIONS AND STANDARDS

- A. Install in compliance with the requirements of the NEC, CED, OSHA, and BICSI recommendations
- B. Comply with state and local laws and ordinances, regulations, and codes applicable with the installation
- C. Should any change in plans or specifications be required to comply with governmental regulations, notify the Architect at the time of submittal
- D. Follow best industry standards and manufacturers' installation instructions for quality control and as a basis for final acceptance

1.10 SPECIAL CONDITIONS

- A. Standards, specifications, drawings, and codes referred to herein shall be considered a part of these Specifications
- B. Local fees and permits and services of inspection authorities shall be obtained and at no additional cost to the District. Cooperate with local utility companies with respect to their services. Include in contract sum costs to be incurred relative to the installation of the system described herein.

1.11 INSPECTION, TESTS AND GUARANTEES

- A. After the installation is complete, present the Architect with testing completed per these specifications. The installation shall be demonstrated to be in accordance with the requirements of these Specifications. Any defects revealed shall be promptly corrected and re-tested at no additional cost to the District.
- B. Work, equipment, and material shall be guaranteed as shown in the contract documents

1.12 CONTRACTOR'S QUALIFICATIONS

- A. Contractor shall be a licensed telecommunications contractor and be in good standing with Contra Costa College Community College District
- B. Contractor shall be an authorized ADC TrueNet[®] Integrator

1.13 CONTRACTOR'S STAFFING

- A. Simultaneously with submittal of signed agreement, submit a proposed staffing plan for

review and acceptance by the Architect

- B. Identify in the proposed staffing plan a project manager having a minimum of five years telecommunications installation experience and three years project management experience
- C. Provide information to document the experience of the project manager in proposed staffing plan
- D. Revise and re-submit the proposed staffing plan as required for acceptance by the architect. After acceptance of the staffing plan, notify the Architect in writing of any revisions to the staffing plan. Changes in the level of staffing or substitutions of staff for those named in the accepted staffing plan shall require the acceptance of the Architect.
- E. Failure to maintain a qualified project manager on-site at times work is in progress shall be considered a material breach of this Contract, entitling the District's representative to issue a stop work order until the project manager is on-site

PART 2 PRODUCT

2.01 MATERIALS

- A. If products and materials are specified or indicated on the project drawings for a specific item or system, use those products or materials. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of product data submittal.

2.02 COMPONENTS

- A. Part numbers and product codes in these Specifications are correct as of the time of writing. Manufacturers do change part numbers and product codes from time to time. In cases where current part numbers or product codes differ from the Specifications, provide products meeting the technical and/or performance specifications of the material stated in these specifications. Notify the Architect of any product code and/or part number changes from the material list submittal.
- B. Product consistency: Provide product from a single manufacturer for a given item of equipment or material throughout the installation.

PART 3 EXECUTION

3.01 STAFFING

- A. Provide a supervisory work force sufficient to maintain an efficient performance of the contractor's work force. Designate in writing to the Architect a dedicated full-time foreman as contact for resolution of problems, job coordination, additions, changes, etc., who shall be on-site during the performance of this work. The foreman shall have full authority to represent the contractor in making decisions and executing the work.
- B. Personnel shall be fully licensed and qualified to perform the work designated herein
- C. Provide installers with the required tools to perform each activity. Installers shall be trained in the use of all tools prior to beginning work. The Architect reserves the right to review the tool lists and tool maintenance procedure of the contractor.

3.02 ORGANIZATION OF WORK

- A. Furnish to other trades information and measurements relating to the work which they may require and cooperate with them in any way necessary to assure the orderly and efficient

execution of all work.

- B. Maintain a file of shop drawings and other submissions at the job site. These shop drawings and submissions shall be made available to the Architect at his request.
- C. Work shall remain accessible so as to permit the Architect to observe and inspect the work during the course of construction
- D. When directed, make modifications as needed and at no additional cost to the District to prevent conflict with work of other trades, for compliance with the intent of the design or to meet local codes

3.03 INSTALLATION

- A. Examine and compare the drawings and specifications relating to communications cable pathways to the existing conditions and report discrepancies between them to the Architect. Obtain from the Architect written instructions for required changes.

3.04 PROTECTION OF WORK AND PROPERTY

- A. Do not install communications equipment in the IDF/TR until such time as other trades have completed their work in those areas

3.05 RECORD DOCUMENTS

- A. Keep an accurate record of all deviations between the work as shown on the drawings and that which is installed
- B. Upon completion of work and acceptance by the Architect, provide an editable as-built drawings (.dwg format) and documentation (.PDF format) as described within these Specifications
- C. Provide as-built drawings showing cable type, routing, and numbering/labeling of cabling and supporting infrastructure. See the related sections for additional requirements.
- D. Provide scaled (1/8th inch) as-built drawings for communications. Provide ARCH-E1 sized drawing in IDF/TR showing the locations of the devices. This is a separate - and additional - requirement from the as-builts required by Division 1 and 0.

3.06 ACCEPTANCE

- A. Work indicated on the project drawings and specifications is complete
- B. As-built drawings reviewed and review comments and deficiencies resolved
- C. Cables have been tested and test results have been reviewed and comments and deficiencies resolved
- D. Cables are labeled per specifications
- E. Specified shop drawings have been received
- F. Issues and deficiencies identified in field reports and punch lists have been resolved
- G. Provide written notice of final completion of the communications cabling system. Upon receipt, the Architect will review/observe the completed installation. Once the Architect is satisfied that work is in accordance with the contract documents, the contractor will be notified in writing.

END OF SECTION

SECTION 17731

PATHWAYS FOR COMMUNICATION SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work includes labor and material to provide pathways that support communication systems and to include all materials, services, facilities, tools, and equipment necessary or used to provide a complete pathway system. The work of this section shall include the following:
 - 1. Cable trays and supporting hardware
 - 2. Cable supports (e.g. J-hooks) and supporting hardware

1.02 REFERENCES

- A. TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises (2009)
- B. TIA-568-C.1 Commercial Building Telecommunications Cabling Standard (2009)

1.03 RELATED WORK

- A. 17730 - Communications

1.04 SUBMITTALS

- A. List of materials proposed for this work. If catalog cut sheets are used, indicate with pointers which product on the catalog sheet is proposed. Cut sheet shall include technical information about the product(s) if manufacturer and part number is other than is specified.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cable tray: Chatsworth, B-Line, GS Metals or equal
- B. J-hooks: Erico, Chatsworth, Panduit or equal

2.02 CABLE TRAY

- A. Steel wire mesh cable tray for communications cables: Constructed of welded steel wire mesh with a continuous safety-edge wire lip.
 - 1. Cable tray shall be a manufactured system complete with required mounting hardware and with fittings and ground straps (or equal) needed to form a bonded (grounded) system. The wire shall be welded, bent, and surface-treated after the wire manufacturing process.
 - 2. The wire tray finish shall be hot dip galvanized steel
 - 3. Widths: 4". Depth: 2"
 - 4. Nominal mesh size: 4"x2"
 - 5. GS Metals, Chatsworth or equal
- B. Cable tray fittings: By same manufacturer as the cable tray with same finish as cable tray.

1. In-line splicing of straight sections: GS Metals SPLICE BAR and FTHDWE ¼ splice washers and associated nuts and bolts or equal.
 2. Short-radius tee, cross or turn: GS Metals 90 Degree bar and FTHDWE ¼ splice washers and associated nuts and bolts or equal.
 3. Standard radius tee, cross or turn: GS Metals SPLICE BAR and FTHDWE ¼ splice washers and associated nuts and bolts or equal.
 4. Grounding hardware: GS Metals GROUND BOLT, Thomas & Betts or equal.
- C. Paint to match ceiling: Coordinate with Architect for color. Painting to include cable tray and mounting hardware.

2.03 J-HOOKS (Cable Supports)

- A. Wide based supports with beveled or rounded edges to maintain cable manufacturer's recommended cable bend radii. Erico CATxxHP series, Panduit J-Pro or J-Mod series or equal.

PART 3 EXECUTION

3.01 CABLE TRAY INSTALLATION

- A. Install cable tray per drawings
- B. Level cable tray to a tolerance of 0.5-inch over 10 feet of cable runway
- C. Join and support cable tray using cable tray manufacturer's recommended fittings
- D. Support cable tray on 60" centers using 3/8" threaded rod anchored to overhead concrete decking
- E. Debur cable tray field-cuts prior to placement
- F. Ground cable tray sections together and to building ground

3.02 J-HOOK INSTALLATION

- A. Size J-hooks for number of cables being supported and so that cable sag between points of support is not greater than 2"
- B. Provide J-hooks where cables transition vertically or horizontally
- C. Provide J-hooks every 5' (maximum) in addition to conditions covered in Paragraph 3.02A.
- D. Adhere to manufacturer's printed instructions when installing J-hook supports.

3.03 ACCEPTANCE

- A. All cable tray indicated on the telecom drawings and specifications shall be complete.
- B. As-built drawings shall have been submitted for review and all review comments and deficiencies shall have been resolved. Final as-builts shall have been submitted, reviewed, and found to meet the requirements of the specifications.
- C. Specified shop drawings, samples, and product submittals shall have been submitted for review and all review comments and deficiencies shall have been resolved and found to meet the requirements of the specifications.
- D. Issues and deficiencies identified in field reports and punch lists shall have been resolved.
- E. Provide written notice of final completion of the cable tray and cable supports (J-hooks).

satisfied that all work is in accordance with the contract documents, the contractor will be notified in writing.

3.04 AS-BUILT RECORDS

- A. The project as-built drawings shall show the location and general routing of the cable tray
- B. Provide as-built drawings in hard copy (size: ARCH E1) and electronically in a .dwg or .dxf format.

END OF SECTION

SECTION 17732

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work covered by this section includes labor to complete construction, materials and equipment, and services, facilities, tools, and equipment to perform and complete work. The work of this section shall include, but not limited, the following:
 - 1. Termination mounting hardware
 - 2. Cable managers

1.02 STANDARDS

- A. Except as modified by governing codes and by the contract documents, comply with the applicable provisions and recommendations in referenced sections and those of the manufacture of the equipment being installed.

1.03 SUBMITTALS

- A. Refer to Section 17730 - General Provisions
- B. Manufacturer's cut sheets
- C. Related hardware and hardware accessories required or recommended by manufacturer to effect proper installation of equipment

1.04 REFERENCES

- A. TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises (2009)
- B. TIA-568-C.1 Commercial Building Telecommunications Cabling Standard (2009)

1.05 RELATED WORK

- A. 17730 - General Provisions
- B. 17740 - Structured Cabling
- C. 17735 - Identification for Communications Systems

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Horizontal cable managers: ADC or equal
- B. Termination hardware mounting hardware, ADC (District standard)

2.02 MOUNTING PLATFORM

- A. Rails. For installing cable termination hardware. 105 mounting rails. ADC 6652 2 040-21
- B. UMS ADC 6657 2 165-40

2.03 HORIZONTAL CABLE MANAGERS

- A. Horizontal wire managers. Designed to support the ADC UMS solution. ADC 6657 2 005-03 or 6657 2 005-19/04

2.04 MISCELLANEOUS

- A. Rod mount bracket spacer for use with 105 mounting rails. ADC 6619 2 046-00
- B. Anchors. For concrete. Hilti Kwik-Con II 316-134 THWH

PART 3 EXECUTION

3.01 HARDWARE INSTALLATION

- A. Provide horizontal cable managers per drawings and specifications
- B. Provide UMS mounting hardware in Nursing IDF/TR for cables supporting Sector 6 (sheet TC-2)
- C. Provide Type 105 mounting hardware in IDF/TR directly below Office of Instruction for cabling supporting outlets shown on sheet TC-3
- D. Provide Type 105 mounting hardware in IDF/TR (Elec 2202) for cabling supporting outlets shown on sheet TC-1

3.02 MOUNTING PLATFORM

- A. Provide mounting rails or UMS per drawings and specifications.
- B. Anchor hardware to concrete walls using specified anchors

3.03 CABLE MANAGEMENT

- A. Provide cable management for equipment cords and tie cabling in IDF/TR to allow routing of data cable and cable assemblies between patching points and between points of termination

3.04 ACCEPTANCE

- A. Equipment has been installation per drawings and specifications
- B. Equipment have been labeled per plans and specifications. Issues and deficiencies shall have been resolved.
- C. Equipment shown on TC-series drawings and required per Division 17 specifications have been installed per contract documents and manufacturers' recommendations.
- D. Required shop drawings, samples, and product submittals have been submitted for review

- and all review comments and deficiencies shall have been resolved.
- E. Issues and deficiencies identified in field reports and punch lists have been resolved.
 - F. Provide written notice of final completion of the equipment installed as part of this section. When the Architect satisfied that all work is in accordance with the contract documents, the contractor will be notified in writing.

END OF SECTION

SECTION 17735

IDENTIFICATION FOR COMMUNICATIONS SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work includes labor necessary to perform and complete work, all materials and equipment incorporated or to be incorporated in construction and all services, facilities, tools and equipment necessary to perform and complete work. Work includes, but is not limited to, the following:
 - 1. Labeling communications outlet faceplates
 - 2. Labeling communications cabling
 - 3. Labeling termination hardware
 - 4. Labeling hardware in equipment room
 - 5. Providing a jack table matrix

1.02 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. Specifications and drawings are intended to depict the required labeling. Provide materials shown and/or called for in the project documents necessary for the identification and labeling of components and equipment. Provide labeling materials and workmanship to label components of the communications system, whether specifically called for or not, which are used or are intended to be used in the communications system. Provide incidental equipment, labor, and materials required for the completion of systems whether or not specified or shown on the drawings.

1.03 RELATED WORK

- A. 17730 - Communications
- B. 17731 - Communications Equipment Room Fittings
- C. 17740 - Structured Cabling

1.04 COORDINATION

- A. Coordinate the work specified in this Section with the work in other parts of the contract document, particularly the Division 17 sections (refer to paragraph 1.03)
- B. Direct coordination questions and issues to the Architect

1.05 QUALITY ASSURANCE

- A. Labeling samples are intended to represent the quality and workmanship that is expected to be provided by the Contractor. District will review labeling for numerical correctness as well

as placement position and legibility.

- B. In order to reduce labeling errors, generate schedules of labeling in the form of spreadsheets that can be reviewed by the District prior to printing and placing actual labels.

PART 2 PRODUCTS

2.01 CABLE LABELS

- A. Labels to be polyester and white in color
- B. Minimum size: 1.00" x1.33" (LxW) with a 0.5" x1" printable area
- C. Labels to be self-adhesive
- D. Panduit LJSL5-Y3-1, Tyton or equal

2.02 FACEPLATE AND TERMINAL BLOCK LABELS

- A. Faceplate labels:
 - 1. Polyester and white in color
 - 2. Size: 1.80" x0.375" (LxW)
 - 3. Shall have an adhesive backing
 - 4. Panduit JLEFPS-1, Tyton or equal
- B. ADC block label strip:
 - 1. 8-pair connector blocks: Color: white
 - 2. Labels shall be slide-in paper for use with the transparent plastic holders
 - 3. Labels shall be laser-printed with the labeling scheme as specified
 - 4. ADC Paper Label Sheet 6631 3 102-05/07

PART 3 EXECUTION

3.01 GENERAL

- A. Contractor shall have approved submittals of labeling schemes prior to proceeding with labeling of the various components
- B. Label data cabling at each end with laser-printed specified labels (machine labeled)
- C. Label termination hardware in IDF/TR using specified labels clipped in behind the snap-in transparent plastic label holder
- D. Label faceplates per drawings and specifications

- E. Affix label to the item being identified
- F. Apply adhesives and adhesive-backed labels according to the manufacturers' recommendations and instructions. Replace any labels that are wrinkled, chipped, buckled, not level or not plumb and true.

3.02 CABLE, MODULAR CONNECTOR, AND TERMINATION IDENTIFICATION

- A. Label each station cable and its associated modular connector with a unique identifier consisting of the following:
 - 1. Label faceplate with a District room number. Each modular connector will be labeled with a unique ID (see project drawings)
 - 2. Labels to be white with black lettering. Text size to be sized as large as practical given the size of the label (text should fill 80% of either the available vertical or horizontal space).
- B. Label cabling IDF/TR such that label can be seen (do not label at points where label is not readily accessible)
- C. Label WAOs and floorboxes per project drawings

3.03 JACK TABLE MATRIX

- A. Provide matrix including IDF/TR Rm # | District Rm # | Cable ID | Cable type
- B. Cable type: Cat-6
- C. Provide jack table matrix (paper copy) as part of submittal process for comment/approval. Provide file (.xls or .xlsx) electronically)

3.04 ACCEPTANCE

- A. Identification and labeling work indicated on the drawings and specifications shall be complete. Issues and deficiencies shall have been resolved.
- B. Contractor shall provide written notice of final completion of Work. Upon receipt, the District will review/observe the installation. Once the District is satisfied that work is in accordance with the contract documents, the contractor will be notified in writing.

END OF SECTION

SECTION 17740

STRUCTURED CABLING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work includes labor and material to provide a structured cabling system as defined herein to include all materials, services, facilities, tools, and equipment necessary or used to provide a complete communications cabling system. The work of this section shall include the following:
 - 1. ADC TrueNet® Category 6 IDC copper solution. System to include termination hardware, mounting hardware, modular jacks, and faceplates. Also included are equipment cords and line cords. System to include cable labeling, WAO labeling, termination block labeling, and associated testing and reporting. The system shall be a ADC TrueNet® Category 6 solution.

1.02 REFERENCES

- A. TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises (2009)
- B. TIA-568-C.1 Commercial Building Telecommunications Cabling Standard (2009)
- C. TIA-568-C.2 Category 6

1.03 RELATED WORK

- A. 17730 - Communications
- B. 17731 - Communications Equipment Room Fittings
- C. 17735 - Identification for Communications Systems

1.04 SUBMITTALS

- A. Test instrument documentation: Level IIIe Category 6 tester. Submit model number, serial number, manufacturer, firmware update, and copy of the most recent calibration certificate.
- B. List of materials proposed for this work. If catalog cut sheets are used, indicate with pointers which product on the catalog sheet is proposed. Cut sheet shall include technical information about the product(s) if manufacturer and part number is other than is specified.
- C. Samples:
 - 1. 4-position faceplate complete with three modular connectors - two connectors and one white connector - faceplate with labeling, 4-foot cable whip showing the manufacturer's marking and required cable labeling. Components to be of the type and color that will be installed as part of this Work.
- D. Vendor alliance documentation specific to the telecommunications hardware manufacturer to ensure an end-to-end solution under ADC's 20-year warranty (refer to Section 17730 - Communications - for additional warranty requirements).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with the requirements of this section, manufacturers of cabling and equipment that may be incorporated into the work specified herein are as follows:
 - 1. Copper solutions: ADC
 - 2. Raceway device plates and inserts: Wiremold, Pass and Seymour or equal
 - 3. Cable supports (J-hooks): Erico, Thomas & Betts, Panduit or equal

2.02 CABLE

- A. Data cable: Category 6 compliant. Jacket colors: blue and white. UL Listed CMR. ADC TN6SR-BLxx or TN6SR-WTxx

2.03 CABLE ASSEMBLIES

- A. Line cords: For patching between technology outlet and workstation. Wired 568A. Color: Blue. Length as specified in Part 3. ADC 6645-2-771-xx (where xx is length)
- B. Equipment cords: For patching between 8-pair termination blocks and network switch. Wired 568A. Color: Blue. Length as specified in Part 3. ADC TP6TB0BLxx (where xx is length)

2.04 COPPER TERMINATING HARDWARE

- A. Ultima8 8-pair block. ADC 6468 2 060-06
- B. Hinged label holder. ADC 6689 2 015-01

2.05 MODULAR JACKS

- A. Color - white. Cat-6 UTP. ADC 6830 1 830-01
- B. Color - blue. Cat-6 UTP. ADC 6830 1 830-06
- C. Modular jacks installed in system furniture to fit keystone inserts consistent with Allsteel Concensys furniture systems

2.06 FACEPLATES

- A. 4-port faceplate. Color: white. ADC TNSCSFPSO4-WT
- B. 2-port faceplate (not angled). Color: white. ADC 6644 1 152-01
- C. Modular jack mounting bracket for Allsteel Concensys systems

2.07 MISCELLANEOUS

- A. Rod mount bracket spacer. For use when mounting copper terminating hardware on Type 105 rails. ADC 6619 2 046-00

PART 3 EXECUTION

3.01 CABLE AND WIRE INSTALLATION

- A. Provide data and tie cabling per this specifications and project drawings.
- B. Terminate, test, and label cabling in accordance with these specifications, project drawings, and referenced sections.
- C. Terminate cabling in ascending numeric order

- D. Use Velcro to dress communications cabling in bundles where the cabling is exposed and visible

3.02 HARDWARE INSTALLATION

- A. Provide 8-pair termination blocks in quantities to terminate 110% of installed Cat-6 cables
- B. Provide Type 105 mounting hardware and spacers for cabling supporting Office of Instruction (sheet TC-3) and Sector 5 (sheet TC-1)
- C. Provide ADC UMS mounting hardware for cabling supporting Sector 6. Mount UMS hardware in Nursing IDF in available existing equipment rack space.

3.03 CONNECTOR INSTALLATION

- A. Provide modular connectors as indicated herein and on drawings
- B. Terminate copper modular jacks pinned per 568A
- C. Adhere to manufacturer's printed instructions when installing modular connectors

3.04 EQUIPMENT AND PATCH CORDS

- A. Furnish following quantities and lengths of equipment cords:
 - 1. 4-pair 7-foot Qty=150 (Note: contract based on stated length. Confirm preferred length with District prior to ordering)
 - 2. 4-pair 10-foot Qty=20 (Note: contract based on stated length. Confirm preferred length with District prior to ordering)
- B. Furnish the following quantities and lengths of line cords:
 - 1. 7-foot Qty=150
 - 2. 10-foot Qty=20
- C. Provide District representative a checklist for cable assemblies furnished. Include on checklist a description and count for cords, name of District's representative verifying the receipt of contents, and date of acceptance of the cable assemblies.

3.05 QUANTITIES AND LOCATIONS OF ITEMS

- A. Data cabling: Location and placement of WAO, termination hardware, and other distribution hardware to be installed in locations shown on the drawings or as defined in these specifications.
- B. In case of discrepancies between the drawings, specifications, and/or site conditions, follow established RFI procedures prior to proceeding with affected work.

3.06 CABLE TERMINATIONS

- A. Data cabling: Terminate data cables to ADC termination hardware in IDF/TR

3.07 CABLE LABELING

- A. Label each end of cables
- B. Label faceplates and termination hardware
- C. Adhere to the requirements of Section 17735 - Identifications for Communication Systems and project drawings

3.08 SERVICE COILS

- A. Provide 12" service coil where station cables exit conduits (applies to areas where conduits stub above a ceiling grid)
- B. Provide 6-foot service coil for station cabling in IDF/TR

3.09 TESTING

- A. Test data cables for compliance to Category 6 permanent link performance requirements for the permanent link as defined by TIA-568-C.2
 - 1. Any failing link must be corrected. Re-test failed links to verify conformance to the cited performance requirements.
 - 2. Test results passing but with a "*" are not acceptable.
 - 3. The test equipment (tester) shall comply with or exceed the accuracy requirements for Level IIIe field testers as defined in TIA-568-C.2.
 - 4. The tester shall be within the calibration period recommended by the equipment manufacturer in order to achieve the specified measurement accuracy.
 - 5. Record test results information for each link in the memory of the tester. Transfer results to a Windows-based database. Deliver the database electronically as well as in hard copy. Test results to identify the cable being tested using the same nomenclature as used to label the cable.
- B. The District shall be invited to witness field testing. Notify the District five business days before testing commences.

3.10 ACCEPTANCE

- A. Cabling indicated on the project drawings and specifications shall be complete.
- B. As-built drawings shall have been submitted for review and all review comments and deficiencies shall have been resolved. Final as-builts shall have been submitted, reviewed, and found to meet the requirements of the specifications.
- C. Test results shall accompany as-built drawings for review and all review comments and deficiencies shall have been resolved. Final test results shall have been submitted, reviewed, and found to meet the requirements of the specifications.
- D. Labeling of cables, faceplates, and termination hardware per drawings and specifications shall have been installed. Issues and deficiencies shall have been resolved.
- E. Specified shop drawings, samples, and product submittals shall have been submitted for review and all review comments and deficiencies shall have been resolved and found to meet the requirements of the specifications.
- F. Issues and deficiencies identified in field reports and punch lists shall have been resolved.
- G. Provide written notice of final completion of the telecom cabling and submit required extended warranties. Upon receipt, the District will review the completed installation. Once the District is satisfied that all work is in accordance with the contract documents, the contractor will be notified in writing.

3.11 AS-BUILT RECORDS

- A. The project as-built drawings shall show the types, locations, cable numbers and general routing of installed cable
- B. Provide two sets of as-built drawings for District I/T use (provide additional copies as required per General Conditions). Provide hard copy (size: ARCH E1) and an editable electronic file in .dwg or .dxf format. Upon approval of as-builts, provide copy in IDF/TR.

END OF SECTION