SECTION 07 84 13 - FIRE-STOP SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide manufacturer(s) on site demonstration installation of each system.

B. Clean and prepare all surfaces to receive application of fire-stop or smoke stop systems.

C. Provide code approved fire-stop or smoke-stop systems for openings, holes or gaps; expansion/construction joints; edge of slab; head of wall; wall to wall; and floor to floor, of fire or smoke-rated construction including, but not necessarily limited to, the following:
   1. Openings in floors and wall assemblies with or without penetrating items such as pipes, cables, conduits, etc.
   2. Gaps between edge of floor and back of exterior curtain wall.
   3. Gaps between the top of walls and structure above.
   4. Expansion joints in walls and floors.
   5. Gaps around structural members passing through floors or walls.
   6. Openings through floors/ceilings to shafts or stairwells.

D. All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to specification Section 01 01 00.

1.02 RELATED SECTIONS

A. Section 01 01 00 - Summary of Work.

B. Section 05 50 00 - Metal Fabrications

C. Section 07 92 00 - Sealants

D. Section 09 29 00 - Gypsum Wallboard System

E. Division 15 - Mechanical

F. Division 16 - Electrical

1.03 REFERENCES

A. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

B. ASTM E 814 - Fire Tests of Through-Penetration Fire-stops

C. ANSI/UL 1479 - Fire Tests of Through-Penetration Fire-stops

D. UL 2079 - Fire Tests of Expansion Joints.

1.04 SUBMITTALS

A. Subcontractor or manufacturer shall review ALL penetrating items and all rated penetrated construction and select the UL system that provides the required protection for each situation. Submittal shall list system and product provided to meet the system test requirements. Manufacturer shall review and approve submittal.

B. Provide for file purposes only, a tabulation of UL through-penetration fire-/smoke-stop systems listing across the top of the table the following:
   1. Penetrating items
   2. Penetrated construction
   3. Number of penetrations in opening
   4. Specific UL number
   5. Manufacturer and series

   Vertically list a designation which will then be specifically located on a floor plan.

C. Provide manufacturer's certification indicating that applicator is acceptable to material manufacturer.

D. Provide certification that applicator is a certified applicator.

E. Provide, after installation, a certification from manufacturer stating that each installation has been visually inspected to be in accordance with a UL test, listing the test number. This certification is required prior to concealing or enclosing the installation and as a requirement for payment.

F. Submittals are for record purposes only, and will not be reviewed by the Architect.

1.05 (NOT USED)

1.06 WARRANTY

A. Replace and/or repair systems which fail within two years because of loss of cohesion, adhesion, abrasion resistance, extrusion resistance, migration resistance, or general durability, or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the use indicated. Repair or replace other materials and equipment damaged as a result of systems failures.
   1. Manufacturer's warranty shall cover defects in materials within that time.
   2. Subcontractor shall repair and replace defects in workmanship that may develop within that time and provide all labor associated with material replacement.

1.07 (NOT USED)

1.08 PROJECT/SITE CONDITIONS

A. Existing Conditions
   1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
   2. Proceed with installation only after penetrations of the rated construction and supporting devices have been installed.

B. Environmental Requirements
   1. Furnish adequate ventilation if using solvent.

2. Furnish forced air ventilation during installation if required by manufacturer.
3. Do not proceed with installation when temperature or humidity conditions exceed the manufacturer's recommendations.
4. Keep flammable materials away from sparks or flame.
5. Provide masking and drop cloths to prevent contamination of adjacent surfaces by fire stopping materials.

1.09 (NOT USED)

1.10 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum two years experience installing UL classified firestopping systems and trained by manufacturer, or manufacturer's representative, in installation procedures based on published UL tested fire-stop systems. Applicator must be a certified applicator.

B. Fire-stop/smoke-stop system installation must meet requirements of ASTM E 814 and UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated. Firestopping shall emit no toxic or combustible fumes.

C. Proposed fire-stop/smoke-stop material and methods shall conform to applicable governing codes.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of Design: Hilti Construction Chemicals Inc., Tulsa, Oklahoma.

B. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".
1. 3M Fire Protection Products, St. Paul, Minnesota
2. Nelson Firestop Products, Tulsa, Oklahoma
3. STI (Specified Technologies, Inc.)

C. All fire stopping shall be from the same manufacturer.

2.02 FIRE/SMOKE STOPPING MATERIALS

A. Sleeves, openings, gaps, expansion joints and sealants shall comply with applicable codes and other references listed in Article 1.03, recommended practices and standards, and manufacturer's instructions. Fire sealants and devices shall have ability to prevent spread of flame, smoke or water through the penetration for the designated time of protection, and shall pass ASTM E 814 and UL 1479 or UL 2079 tests for required fire rating.

B. Systems and devices and manufacturers shall be listed in the Underwriters Laboratories Building Materials Directory and/or Fire Resistance Directory.

C. Systems must have "F" and "T" ratings where required.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to be in contact with fire stopping materials of dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting, adhesion or the required fire resistance.

B. Power to exposed cable in the work area shall be shut off.

C. Cable jacketing shall be inspected and any damage shall be reported to the General Contractor before proceeding.

3.02 INSTALLATION

A. Install penetration seal materials in accordance with printed instructions of the UL Building Materials Directory and in accordance with manufacturer's instruction to ensure an effective fire, smoke and water barrier.

B. Protect materials from damage on surfaces subject to traffic.

C. Provide through-penetration fire-stop systems for penetrations through smoke or fire rated construction.
   1. Remove sleeves if required by UL listing for system selected.
   2. Coordinate with Divisions 15 and 16 subcontractors for sleeves and annular clearances.
   3. Install fire stopping seals so as to maintain integrity of seals with expansion and contraction of penetrating item.
   4. Duct penetrations through fire or smoke rated construction: where either a smoke damper only is provided or no damper is required at a penetration, seal entire annular space between sleeve and each face of adjoining construction as required herein. DO NOT PROVIDE SEALANT WHERE A FIRE DAMPER OR COMBINATION FIRE/SMOKE DAMPER IS REQUIRED. Refer to HVAC air distribution drawings and Division 15 of the specifications for information on dampers.

3.03 IDENTIFICATION

A. Identify through-penetration fire-stop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each fire-stop system installation where labels will be visible to anyone seeking to remove penetrating items or fire-stop systems. Include the following information on labels:
   1. The words: "Warning--Through-penetration Fire-stop System--Do Not Disturb. Notify Building Management of Any Damage".
   2. Contractor's name, address and phone number.
   3. Through-penetration fire-stop system designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Through-penetration fire-stop system manufacturer's name
   6. Installer's name.

3.04 FIELD QUALITY CONTROL

A. Keep copy of manufacturer's instructions, data and installation drawings for comparison of actual installation to instructions, data and drawings.

B. Prior to enclosing system, manufacturer shall visually inspect and require correction be made where needed.

C. Inspect and/or correct fire/smoke stopped areas to ensure proper installation prior to concealing or enclosing fire/smoke stopped installations.

D. Areas of work shall remain accessible until inspection and approval by the Applicable Code Authorities.

E. Perform under this Section patching and repairing of fire/smoke stopping caused by cutting or penetration of other trades.

3.05 ADJUSTING AND CLEANING

A. Clean up spills of fire/smoke stopping liquid components from all surfaces.

B. Neatly cut and trim materials as required by the Architect.

C. At completion, remove equipment, materials and debris, leaving project in undamaged, clean condition.

END OF SECTION 07 84 13

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clean and prepare joint surfaces.

B. Sealant and backing materials.
   1. Sealant/caulking and backing material in interior joints, including specifically, but not necessarily limited to, the following:
      a. Interior expansion and control joints.
      b. Joints at perimeter of interior door frames, glazed openings, entrance/ storefronts, windows and curtain walls.
      c. Exposed joints between interior dissimilar materials.
      d. Wall and slab penetrations (nonrated).
      e. Joints between tub, shower, lavatory fixtures and other wet areas and substrate.
      f. At plumbing, mechanical, electrical intrusions into or through nonsmoke or nonfire rated walls, floors and ceilings with or without escutcheons.
   2. Sealant and backing material in all exterior joints, including specifically, but not necessarily limited to, the following:
      a. Exterior perimeter joints of hollow metal work.
      b. Masonry joints at flashing inserts, cap flashings.
      c. Bed joints of copings, both sides of parapet.
      d. Joints of stonework set without mortar.
      e. Masonry joint at shelf angles/spandrel angles.
      f. Joints at perimeter of exterior door frames, entrances/storefronts, windows, curtain walls and louvers.
      g. Under exterior thresholds.
      h. Expansion and control joints.
      i. Exposed joints between exterior dissimilar materials.
      j. Wall penetrations.

C. The VOC content of sealants shall be less than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1168 and all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.

1.02 RELATED SECTIONS

A. Section 07 84 13 - Fire-stop Systems: Sealants provided under Section 07 92 00.

B. Section 08 11 13 - Metal Doors and Frames: Sealants used in conjunction with metal frames.

C. Section 09 30 00 - Ceramic Tile: Sealants used in conjunction with ceramic tile.

1.03 REFERENCES

A. AAMA 808 - Voluntary Specification for Exterior Perimeter Sealing Compound.

B. ASTM C 719 - Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).

C. ASTM C 794 - Standard Test Method for Adhesion-in-peel of elastomeric Joint Sealants.

D. ASTM C 834 - Latex Sealing Compounds.

E. ASTM C 919 - Practice for Use of Sealants in Acoustical Applications.

F. ASTM C 920 - Elastomeric Joint Sealants.

G. ASTM C 1021 - Practice for Laboratories Engaged in Testing of Building Sealants.

H. ASTM C 1085 - Specification for Butyl Rubber-Based Solvent-Release Sealants.

I. ASTM C 1087 - Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

J. ASTM C 1193 - Standard Guide for Use of Joint Sealants.

K. ASTM C 1248 - Standard Test Method for Staining of Porous Substances by Joint Sealants.

L. ASTM C 1311 – Specification for Solvent Release Sealants.

M. ASTM C 1330 – Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

N. ASTM D 1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

O. ASTM E 90 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

P. ASTM E 548 – Guide for General Criteria Used for Evaluating Laboratory Competence.

Q. FS TT-S-00230C(2) - Sealing Compound; Elastomeric Type, Single Component (for Caulking, Sealing and Glazing in Buildings or Other Structures)

R. 21 CFR 177.2600 - Rubber Articles Intended for Repeated Use.

1.04 SUBMITTALS

A. Submit Product Data in accordance with Section 01 33 00.

B. Submit duplicate physical Samples of sealant colors.

1.05 (NOT USED)

1.06 WARRANTY

A. Provide written material warranty from sealant manufacturer for a period of 20 years for

silicone and 5 years for all others and workmanship warranty covering work performed from subcontractor for a period of 5 years for silicone and 2 years for all others in accordance with Section 01 77 00.

B. Warranty: Replace and/or repair sealants which fail during the warranty period because of loss of cohesion or adhesion, or do not cure.
   1. Manufacturer's written warranty shall cover defects in materials within that time.
   2. Subcontractor's written warranty shall stipulate that he will repair and replace defects in workmanship that may develop within that time and provide all labor associated with material replacement.

1.07 (NOT USED)

1.08 PROJECT/SITE CONDITIONS

A. Commencement of installation indicates acceptance of existing conditions.

1.09 SEQUENCING AND SCHEDULING

A. Conduct a preinstallation conference at project site with Contractor, subcontractor, sealant manufacturer's technical representative and Architect present.

1.10 QUALITY ASSURANCE

A. Applicator: The sealant work shall be performed by a firm having five (5) years experience in the installation of specified materials on projects comparable to this project.

B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.11 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paving/Flooring
   1. Basis of Design
      a. Level - Pecora NR 200
      b. Ramp - Pecora Dynatred
   2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".
      a. Bostik Chem Calk 550/2641

b. Sika Flex 2CSL/2CNS
c. Sonneborn SL-2/SL-2 Slope Grade
d. Tremco THC 900/901

B. General Building (Nonpaving Exterior)
1. Basis of Design
a. Pecora 864 Silicone
b. Pecora 890 Silicone
2. Other Acceptable Manufacturers subject to compliance with requirements
a. Dow 790

C. General Building (Nonpaving Exterior)
1. Basis of Design: Pecora Dynatrol II
2. Other Acceptable Manufacturers subject to compliance with requirements
a. Bostik Chem Calk 550
b. Sika Flex 2CNS/SL
c. Sonneborn NP-2
d. Tremco Dymeric 511
e. W. R. Meadows Dualthane

D. General Building (Nonflooring Interior)
1. Basis of Design: Pecora AC-20+ Silicone
2. Other Acceptable Manufacturers subject to compliance with requirements
a. Bostik Chem Calk 900
b. Sonneborn Sonolac
c. Tremco Acrylic Latex 834

2.02 MATERIALS

A. Provide in accordance with ASTM C 1193.

B. Flooring
1. Sealant: Two part urethane Type I; conforming to ASTM C 920; self-leveling type for application in horizontal joints; withstand movement of up to 25% extension and 25% compression of joint width and satisfactorily applied throughout a temperature range of 40° F. (4° C.) to 80° F. (27° C.); Shore A hardness of minimum 25 and maximum 50; nonstaining; nonbleeding; color as selected.
2. Sealant: Two part urethane Type II; conforming to ASTM C 920; nonsag type for application on ramps; withstand movement of up to 25% extension and 25% compression of joint width and satisfactorily applied throughout a temperature range of 40° F. (4° C.) to 80° F. (27° C.); Shore A hardness maximum 50; nonstaining; nonbleeding; color as selected.

C. General Building (Nonpaving Exterior)
1. Sealant: One part silicone low modulus; conforming to ASTM C 920; capable of withstanding movement of 50% to 100% extension and 50% compression of joint width and satisfactorily applied throughout a temperature range of 40° F. (4° C.) to 80° F. (27° C.); Shore A hardness of maximum 50; nonstaining and nonbleeding; color as selected.

D. General Building (Nonflooring Interior) - Sealant: One part acrylic latex; conforming to ASTM C 834; withstand movement of up to 7.5% extension and 7.5% compression of joint width and satisfactorily applied throughout a temperature range of 40° F. (4° C.) to

80° F. (27° C.); Shore A hardness of maximum 50; USDA approved and paintable; nonstaining; nonbleeding; nonsagging; color as selected.

2.03 ACCESSORIES

A. Primer: Nonstaining type, as recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Noncorrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Backer Rod (ASTM D 1056): Polyethylene rod of such size as to be compressed 25% when inserted into joint.
1. Horizontal Planes: Closed cell backer rod
2. Other Applications: Either closed cell or soft (reticulated closed cell) backer rod.
3. Open cell backer rod is not acceptable.

D. Bond Breaker Tape: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean, prepare, size and mask joints in accordance with manufacturer's instructions. Remove any loose materials and other foreign matter which might impair adhesion of sealant.

B. Verify that joint shaping materials and release tapes are compatible with sealant.

C. Examine joint dimensions and size materials to achieve required width/depth ratios.

D. Use joint filler to achieve required joint depths, to allow sealants to perform properly.

E. Use bond breaker tape in joints too shallow for backer rod.

3.02 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Where job conditions have caused joints to become wider or narrower than that recommended by caulking and sealants manufacturer, do not caulk or seal joints until approval of manufacturer is obtained.

C. Prime all substrates unless directed otherwise by manufacturer.

D. Wall and slab penetrations other than those treated under Section 07 84 13 shall be filled with joint filler and completely sealed with sealant.

E. Tool joints concave. Dry tooling is preferred.

F. Joints: Free of air pockets, foreign embedded matter, ridges, and sags.

G. Clean all adjacent surfaces of sealant material after sealant has been installed, before

sealant has cured.

H. Protect joint sealers during and after the curing period from contact with contaminating substances or damage from construction operations. Cut and remove all damaged sealants and reseal with new materials to produce an indistinguishable repair.

END OF SECTION 07 92 00

SECTION 08 11 13 - METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Custom and fire rated type pressed steel hollow metal doors with flush faces.

B. Custom and fire rated pressed steel hollow metal door frames.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Installation of doors and frames.

B. Section 08 14 16 - Wood Doors.

C. Section 08 71 00 - Hardware.

D. Section 09 29 00 - Gypsum Wallboard Systems.

E. Section 09 91 23 - Painting.

1.03 REFERENCE STANDARDS

A. ANSI/SDI-100 - Recommended Specifications-Standard Steel Doors and Frames of Steel Door Institute, current edition.

B. ANSI A224.1 - Test Procedures and Acceptance Criteria for Prime Painted Steel Surface.

C. ASTM A 153 - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM A 568 - Steel, Sheet Carbon, and High-Strength, Low Alloy Hot-Rolled and Cold-Rolled.

E. ASTM A 569 - Steel, Carbon, Hot-Rolled Sheet and Strip, Commercial Quality.

F. ASTM A 591 - Steel Sheet, Cold-Rolled, Electrolytic Zinc-Coated.

G. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

H. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

I. ASTM A 924 - Steel Sheet, Metallic-Coated (Galvanized) by the Hot-Dip Process.

J. ASTM C 236 - Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box.

K. ASTM C 976 - Test Method for Thermal Performance of Building Assemblies by

Means of a Calibrated Hot Box.

L. DHI A115.IG - Installation Guide for Doors and Hardware (ANSI).

M. HMMA 803 - Steel Tables.

N. NFPA No. 80 - Fire Doors and Windows.

O. NFPA 105 - Installation of Smoke-Control Door Assemblies.

P. NFPA 252 - Fire Tests of Door Assemblies.

Q. SSPC-Paint 20 1982 (Revised 1991) - Paint Specification No. 20: Zinc-Rich Primers (Type I, "Inorganic", and Type II, "Organic")

R. SSPC-SP 1 - Surface Preparation Specification No. 1: Solvent Cleaning.

S. SSPC-SP 3 - Surface Preparation Specification No. 3: Power Tool Cleaning.

T. SSPC-SP 6/NACE No. 3 - Joint Surface Preparation Standard SSPC-SP6/NACE No. 3: Commercial Blast Cleaning.

U. Underwriters' Laboratories, Inc. (UL) and Warnock Hersey International (WHI), as applicable to fire rated hollow metal doors and frames.

1.04 SUBMITTALS

A. Shop Drawings and Product Data
   1. Submit in accordance with Section 01 33 00.
   2. Indicate general construction, configurations, jointing methods, reinforcements, anchorage methods, hardware locations and locations of cutouts for glass. and louvers.
   3. Door schedule in accordance with door numbers shown on drawings.

B. Certification
   1. Provide manufacturer's certification that doors are in compliance with SDI standards for Grade III, Model 2 and 2A and frames are in compliance with SDI standards.
   2. Provide manufacturer's certification that products are in compliance with UL, WHI and NFiPA 80 requirements.

1.05 DELIVERY, STORAGE AND HANDLING

A. All stored material shall be protected from the elements in accordance with Section 01 60 00 and manufacturer's requirements.

B. Protect doors and other finished metal work before delivery with kraft paper, adhesive tape, packed in a carton or other approved method. Bituminous interwoven sheets or other types of protective paper that cause damage to paint or door will not be permitted.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Basis of Design: Steelcraft

B. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".
   1. Phillip Manufacturing Company
   2. Acme Steel Door Corp.
   3. Ceco Corp.
   4. Pioneer Industries
   5. Republic
   6. Curries

2.02 HARDWARE LOCATIONS

A. Locate hardware on doors and frames in accordance with standards specified in Section 08 71 00.

2.03 CLEARANCES AND TOLERANCES

A. Edge clearances shall be provided as follows:
   1. Between Doors and Frames, at Head and Jambs: 1/8 inch (3mm).
   2. At Door Sills: 3/8 inch (10 mm) above noncombustible sill or 1/2 inch (13 mm) above finish floor covering or 3/4 inch (19 mm) above concrete slab, whichever is the least. Door must be compatible with lipped threshold.
   3. Between Meeting Edges of Pairs of Doors: 1/8 inch (3 mm).

B. Door tolerances shall not exceed the following:
   1. Width and Height: $\pm$3/64 inch (1.2 mm)
   2. Thickness: $\pm$1/16 inch (1.5 mm)
   3. Squareness: Measured diagonally from each corner to each opposite corner across the face of the door, the two dimensions shall not vary more than $\pm$1/16 inch (1.5 mm).
   4. Flatness: Measured from a 6 foot straightedge
      a. Along vertical and horizontal centerlines of the door, each face, bow distance from bottom of straightedge, +3/16 (5 mm) inch maximum.
      b. Along lock and hinge edges, 1 inch (25 mm) in from each edge, each face, bow distance from bottom of straightedge, +1/16 (1.5 mm) inch maximum.

C. Frame tolerances shall not exceed the following:
   1. Width: Measured between rebates at the head, +1/16 inch (1.5 mm), -1/32 inch (1 mm).
   2. Height: Measured along total length of jamb rebate, $\pm$3/64 inch (1.2 mm).
   3. Cross Section Profile
      a. Frame depth and face, $\pm$1/32 inch (1 mm) each.
      b. Rebate width, $\pm$1/64 inch (0.4 mm).
      c. Stop height, $\pm$1/32 inch (1 mm).
      d. Throat opening, $\pm$1/32 inch (1 mm)

D. Hardware tolerances for doors and frames shall not exceed the following:
   1. Location, $\pm$1/64 inch (0.4 mm).
   2. Hardware cutout template dimensions, +0.015 inch, -0 inch.

2.04 HOLLOW METAL DOORS

A. Shall be in accordance with SDI standards unless more stringent requirements are listed herein, Grade III, Model 2 and 2A.

B. Materials: Commercial quality, level, cold-rolled steel conforming to ASTM A 568 and free of scale, pitting or other surface defects. Face sheets not less than 16 gauge. Material for exterior doors shall have a zinc coating of not less than 0.60 ounces per square foot ($185g/m^2$) and shall be "A" series galvanized in accordance with ASTM A 924 referenced in SDI standards.

C. Design and Construction

1. All doors shall be custom made, of the types and sizes shown and shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Minimum door thickness shall be 1-3/4 inch (45 mm).
2. All work shall be rigid and neat in appearance, free from warpage or buckle. Corner bends shall be true and straight, and of minimum radius for the gauge of metal used.
3. Face sheets shall be stiffened by continuous vertical formed steel sections spanning the full thickness of the interior space between door faces. These stiffeners shall be not less than 22 gauge, spaced not more than 6 inches (150 mm) apart and securely attached to face sheets by spot welds not more than 5 inches (130 mm) on center. Spaces between stiffeners shall be sound-deadened and insulated the full height of the door with .6 lb./cu. ft. ($10 kg/m^2$) density insulation. For exterior doors, U-value shall be a minimum of 0.3 as tested in accordance with ASTM C 236 or C 976.
4. Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door. All such welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.
5. Top and bottom edges of all doors shall be closed with a continuous flush steel channel not less than 16 gauge, extending the full width of the door and spot welded to both faces. Openings shall be provided in the bottom closure of exterior doors to permit the escape of entrapped moisture.
6. Edge profiles shall be provided on both vertical edges of doors as follows:
   a. Single-Acting Swing Doors: Beveled 1/8 inch (3 mm) in 2 inches (50 mm).
   b. Double-Acting Swing Doors: Rounded on 2-1/8 inch (54 mm) radius.
7. All hardware furnished by the hardware contractor for single-acting doors shall be designed for beveled edges as specified in subparagraph 6 above.
8. Hardware Reinforcements
   a. Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accord with the approved hardware schedule and templates provided by the hardware contractor. Where surface-mounted hardware is to be applied, door shall have reinforcing plates only; all drilling and tapping will be performed under Section 06 10 00.
   b. Minimum gauges for hardware reinforcing plates shall be as follows:
      1) Hinge and Pivot Reinforcements: 7 gauge.
      2) Reinforcements for Lock Face, Flush Bolts, Concealed Holders, Concealed or Surface-Mounted Closers: 12 gauge.
      3) Reinforcements for All Other Surface-Mounted Hardware: 12

gauge.

9. Glass Mouldings and Stops
   a. Where specified or scheduled, doors shall be provided with hollow metal mouldings to secure glazing provided under Section 08 80 00 in accordance with glass opening sizes shown.
   b. Fixed mouldings shall be securely welded to the door on the security side.
   c. Loose stops shall be not less than 20 gauge steel, with mitered corner joints, secured to the framed opening by cadmium- or zinc-coated countersunk screws. Snap-on attachments not permitted.
10. Louvers shall be minimum 18 gauge, inverted "V", of welded blade type of construction, sized to provide the free air area indicated.
11. Labeled Doors: See Article titled "Labeled Doors and Frames".
12. Provide astragals for all pairs of doors except where specifically omitted.

2.05 (NOT USED)

2.06 HOLLOW METAL FRAMES

A. Materials
   1. Frames for exterior openings shall be made of commercial grade cold-rolled steel conforming to ASTM A 366 and A 568 and SDI, not less than 14 gauge. Material for exterior frames shall have a zinc coating of not less than 0.60 ounces per square foot (185g/m^2) and shall be "A" series galvanized in accordance with ASTM A 924 (formerly A 525) referenced in SDI standards.
   2. Frames for interior openings shall be either commercial grade cold-rolled steel conforming to ASTM A 366 or commercial grade hot rolled and pickled steel conforming to ASTM A 569. Metal thickness shall be not less than 16 gauge for frames in openings 4 feet (1200 mm) or less in width; not less than 14 gauge for frames in openings over 4 feet (1200 mm) in width.

B. Design and Construction
   1. All frames shall be custom made welded units with integral trim, of the sizes and shapes shown on approved Shop Drawings.
   2. All finished work shall be rigid, neat in appearance, square, true and free of defects, warp or buckle. Moulded members shall be clean-cut, straight and of uniform profile throughout their lengths.
   3. Jamb depths, trim, profile and backbends shall be as shown.
   4. Corner joints shall have all contact edges closed tight, with trim faces mitered and continuously welded, and stops mitered. The use of gussets will not be permitted.
   5. Minimum depth of stops shall be 5/8 inch.
   6. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing in the field.
   7. Frames for multiple or special openings shall have mullion and/or rail members which are closed tubular shapes having no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth.
   8. Hardware Reinforcements
      a. Frames shall be mortised, reinforced, drilled and tapped at the factory for fully templated mortised hardware only, in accord with approved hardware schedule and templates provided by the hardware contractor. When surface-mounted hardware is to be applied, frames shall have reinforcing plates only; all drilling and tapping will be performed under Section 06 10 00.
      b. Minimum thickness of hardware reinforcing plates shall be as follows:

1) Hinge and Pivot Reinforcements: 7 gauge, 1-1/4 inch (35 mm) x 10 inch (250 mm) minimum size.
2) Strike Reinforcements: 12 gauge.
3) Flush Bolt Reinforcements: 12 gauge.
4) Closer Reinforcements: 12 gauge.
5) Reinforcements for: Surface-mounted hardware - 12 gauge; hold-open arms - 12 gauge; surface panic devices - 12 gauge.

9. Floor Anchors
   a. Floor anchors shall be securely welded inside each jamb, with two holes provided at each jamb for floor anchorage.
   b. Where so scheduled or specified, adjustable floor anchors, providing not less than 2 inch (50 mm) height adjustment, shall be provided.
   c. Minimum thickness of floor anchors shall be 14 gauge.
10. Jamb Anchors
   a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the T-strap type. Anchors shall be not less than 16 gauge steel. The number of anchors provided on each jamb shall be as follows:
      1) Frames Up to 7 Feet 6 Inch (2300 mm) Height: 3 anchors.
      2) Frames 7 Feet 6 Inches (2300 mm) to 8 Feet (2400 mm) Height: 4 anchors.
      3) Frames Over 8 Feet (2400 mm) Height: 1 anchor for each 2 feet (600 mm), or fraction thereof, in height.
   b. Frames for installation in stud partitions shall be provided with steel anchors of suitable design to allow passage of grout, not less than 18 gauge thickness, securely welded inside each jamb as follows:
      1) Frames up to 7 Feet 6 Inch (2300 mm) Height: 4 anchors.
      2) Frames 7 Feet 6 Inches (2300 mm) to 8 Feet (2400 mm) Height: 5 anchors.
      3) Frames Over 8 Feet (2400 mm) Height: 5 anchors plus 1 additional for each 2 feet (600 mm), or fraction thereof, over 8 feet (2400 mm).
      4) Frames 5 feet (1500 mm) wide and over shall be provided with three equally spaced anchors securely welded in the head of the frame (similar to jamb anchors).

11. All frames shall be provided with a steel spreader temporarily attached to the feet of both jambs to serve as a brace during shipping and handling.
12. Loose glazing stops shall be of cold-rolled steel, not less than 20 gauge thickness, mitered corner joints and secured to the frame with countersunk cadmium- or zinc-plated screws.
13. Labeled Frames: See Article titled "Labeled Doors and Frames".

2.07 LABELED DOORS AND FRAMES

A. Conform to requirements of NFPA 80.

B. Provide for those openings requiring fire protection ratings as indicated. Such doors and frames shall be constructed as tested and approved by UL or other nationally recognized testing agency having a factory inspection service.

C. Rated doors and frames shall be similar in appearance and quality to previously specified doors and frames.

D. If any door or frame specified to be fire rated cannot qualify for appropriate labeling because of its design, hardware or any other reason, the Architect shall be so notified by means of the product's being qualified at the time of submittal.

E. Provide testing agency's metal labels securely fastened to doors and frames.

2.08 (NOT USED)

2.09 FINISH

A. After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities. Products shall then be chemically treated to insure maximum paint adhesion and shall be coated on all exposed surfaces with a rust-inhibitive primer which shall be cured before shipment. The primer shall meet the requirements in ANSI A224.1 "Test Procedures and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames".

B. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
   1. Comply with SSPC-PA1, "Paint Application Specification No. 1", for steel sheet finishes. Apply primers and organic finishes to doors and frames after fabrication.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation of doors and frames is included in Section 06 10 00.

END OF SECTION 08 11 13

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door Hardware, including electric hardware.
2. Wall or floor-mounted electromagnetic hold-open devices.
3. Power supplies for electric hardware.
4. Wiring diagrams for electric hardware.

B. Related Sections:

1. Section 06 20 00 - Finish Carpentry: Finish Hardware Installation
2. Section 07 9000 - Joint Sealers – exterior thresholds
3. Section 08 10 00 - Metal Doors and Frames
4. Section 08 20 00 - Wood Doors
5. Section 08 24 00 - Integrated Security Systems
6. Section 08 30 00 - Special Doors
7. Section 10 65 00 - Operable Partitions
8. Section 16 20 00 - Electrical Power
9. Section 16 72 20 - Fire/Life-Safety System
10. Section 16 72 40 - Security Access Systems

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs, except where scheduled.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Conduit, junction boxes & wiring.
8. Folding partitions, except cylinders where detailed.
9. Sliding aluminum doors, except cylinders where detailed.
10. Access doors and panels, except cylinders where detailed.
11. Corner Guards.
12. Wrought Iron railing gates and supports.

1.2 REFERENCES:

Use date of standard in effect as of Bid date.

A. American National Standards Institute – ANSI 156.18 – Materials and Finishes.

B. BHMA – Builders Hardware Manufacturers Association

C. DHI – Door and Hardware Institute

D. NFPA – National Fire Protection Association

1. NFPA 80 – Fire Doors and Windows
2. NFPA 105 – Smoke and Draft Control Door Assemblies
3. NFPA 252 – Fire Tests of Door Assemblies

E. UL – Underwriters Laboratories

1. UL10C – Positive Pressure Fire Tests of Door Assemblies.
2. UL 305 – Panic Hardware

F. WHI – Warnock Hersey Incorporated

G. 2013 State of California Building Code

H. Local applicable codes

I. SDI – Steel Door Institute

J. WI – Woodwork Institute

K. AWI – Architectural Woodwork Institute

L. NAAMM – National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS & SUBSTITUTIONS

A. SUBMITTALS: Submit six copies of schedule per Section 01330. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Description of door location using space names and numbers as published in the drawings.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, handing, materials, fire-rating and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.
11. Wiring Diagrams.
12. Manufacturer's technical data and installation instructions for electronic hardware.

13. Date of jobsite visit.

B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.

C. Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.

D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.

F. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE:

A. Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C / California State Fire Marshal Standard 12-7-4 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

1. Note: scheduled resilient seals may exceed selected door manufacturer's requirements.

2. See 2.6.E for added information regarding resilient and intumescent seals.

E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.

F. Pre-Installation Meetings: Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Delivery: coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores: secured delivery direct to Owner's representative.

B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:

1. Location of embedded and attached items to concrete.
2. Location of wall-mounted hardware, including wall stops.
3. Location of finish floor materials and floor-mounted hardware.
4. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
5. Manufacturer templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation. Do not order hardware until the submittal has been reviewed by the frame and door suppliers for compatibility with their products.

D. Prior to submittal, carefully inspect existing conditions at each opening to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict or incompatibility between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.

1. Submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.

1.7 WARRANTY:

A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:

1.	Locksets:	Three years
2.	Extra Heavy Duty Cylindrical Lock:	Seven Years
3.	Exit Devices:	Three years mechanical One year electrical
4.	Closers:	Thirty years mechanical Two years electrical
5.	Hinges:	One year
6.	Other Hardware	Two years

1.8 COMMISSIONING:

A. Conduct these tests prior to request for certificate of substantial completion:

1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

1.9 REGULATORY REQUIREMENTS

A. Handles, pull, latches, locks, other operable parts:

1. Readily openable from egress side with one hand and without tight grasping, tight pinching, or twisting of the wrist to operate. 2013 California Building Code Section 11B-309.4.
2. The force required to activate the operable parts: 5.0 pounds maximum, per 2013 California Building Code Section 11B-309.4.
3. Locate latching hardware between 34 inches to 44 inches above finished floor, per CBC 2013, Section 11B-404-2.7.
4. Locate exit devices between 36" to 44" above finished floor and normally use the manufacturer's recommended mounting heights per standard templates which are within the above mounting height ranges.

B. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2013 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.

1. Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.

C. Low-energy powered doors: comply with ANSI/BHMA A156.19. Reference: 2013 California Building Code Section 11B-404.2.9, Exception 2.

1. Where powered door serves an occupancy of 150 or more, provide back-up battery power or stand-by generator power, capable of supporting a minimum of 150 cycles.
2. Actuators, vertical bar type: minimum 2-inches wide, 30-inches high, bottom located minimum 5-inches above floor or ground, top located minimum 35-inches above floor or ground. Displays International Symbol of Accessibility, per 2013 California Building Code Section 11B-703.7.
3. Actuators, plate type: use two at each side of the opening. Minimum 4-inches diameter or 4-inches square. Displays International Symbol of Accessibility, per 2013 California Building Code Section 11B-703.7. Locate centerline of lower plate between 7- and 8-inches above floor or ground, and upper plate between 30- and 44-inches above floor or ground.
4. Actuator location: conspicuously located, clear and level floor/ground space for forward or parallel approach.

D. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per 2013 California Building Code Section 11B-404.2.7.

1. Spring hinges: adjust for 1.5 seconds minimum for 70 degrees to fully-closed.

E. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2013 California Building Code Section 11B-404.2.10.

1. Applied kick plates and armor plates: bevel the left and right edges; free of sharp or abrasive edges.
2. Tempered glass doors without stiles: bottom rail may be less than 10 inches if top leading edge is tapered 60 degrees minimum.

F. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2013 California Building Code Section 11B-404.2.3.

1. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24 inches in depth, may have the clear opening width reduced to 20 inches. Example: shallow closets.
2. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2013 California Building Code 11B-307.4.

G. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway, per 2013 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). 2013 California Building Code Section 11B-303.2 & ~.3.

H. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).

I. Pairs of doors with independently-activated hardware both leafs: limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2013 California Building Code Section 11B-703.4.2.

J. Door and door hardware encroachment: when door is swung fully-open into means-of-egress path, the doo may not encroach/project more than 7 inches into the required exit width, with the exception of door release hardware such as lockset levers or panic hardware. These hardware items must be located no less than 34-inches and no more than 48-inches above the floor/ground. 2013 California Building Code, Section 1005.7.1.

1. In I-2 occupancies, latch release hardware is not permitted to project in the required exit width, regardless of its mounting height, per 2013 California Building Code, Section 1005.7.1 at Exception 1.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Bommer
Continuous Hinges	(IVE) Ives	Markar
Key System	(SCH) Schlage	
Locks	(SCH) Schlage	
Closers	(LCN) LCN	
Auto Flush Bolts	(IVE) Ives	DCI
Coordinators	(IVE) Ives	DCI
Silencers	(IVE) Ives	Hiawatha
Push & Pull Plates	(IVE) Ives	Hiawatha
Kickplates	(IVE) Ives	Hiawatha
Stops & Holders	(IVE) Ives	Hiawatha
Overhead Stops	(GLY) Glynn-Johnson	None available
Thresholds	(ZER) Zero	NGP
Seals & Bottoms	(ZER) Zero	NGP

2.2 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges: Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.
2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

D. Continuous Hinges:

1. Pinned steel/stainless steel type: continuous stainless steel, 0.25-inch diameter stainless-steel hinge pin.

a) Use engineered application-specific wide-throw units as needed to provide maximum swing degree of swing, advise architect if required width exceeds 8 inches.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS:

A. Mortise Locksets and Latchsets: as scheduled.

1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
2. Latchbolts: 3/4 inch throw stainless steel anti-friction type.
3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.

a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.

4. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
5. Thumbturns: Accessible design not requiring pinching or twisting motions to operate.
6. Deadbolts: Stainless steel 1-inch throw.
7. Electric operation: Manufacturer-installed continuous duty solenoid.
8. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
9. Scheduled Lock Series and Design: Schlage L series, 06A design.
10. Certifications:

a) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.

b) ANSI/ASTM F476-84 Grade 31 UL Listed.

2.4 EXIT DEVICES / PANIC HARDWARE- NOR USED

2.5 CLOSERS

A. Surface Closers: [4011/4111]

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.

2. ISO 2000 certified. Units stamped with date-of-manufacture code.

3. Independent lab-tested 10,000,000 cycles.

4. Non-sized and adjustable. Place closers inside building, stairs and rooms.

5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.

6. Advanced Variable Backcheck (AVB): where scheduled, these units commence backcheck at approximately 45 degrees.

7. Adjustable to open with not more than 5.0lbs pressure to open at exterior doors and 5.0lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15lbs.

8. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.

9. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units. EDA arms: rigid main and forearm, reinforced elbow.

10. Exterior door closers: Tested to 100 hours of ASTM B117 salt spray test, furnish data on request.

11. Exterior doors: Seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.

12. Non-flaming fluid, will not fuel door or floor covering fires.

13. Pressure Relief Valves (PRV) not permitted.

B. Electromagnetic Hold-Open Closers: Integrate with UL listed fire/life-safety alarm systems.

1. Multi-point units: hold-open bypass at 80 degree or 140 degree. Swing-free/no-drift arms at pull-side mounted units.

2.6 OTHER HARDWARE

A. Automatic Flush Bolts: Low operating force design.

B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

D. Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.

2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

3. Hardware contractor shall figure a door stop for every door even if one is not included in the specific hardware set.

E. Seals: Finished to match adjacent frame color. Resilient seal material: polyurethane, polypropylene, nylon brush, silicone rubber or solid high-grade neoprene as scheduled. Do not furnish vinyl seal material. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability.

1. Proposed substitutions: Submit for approval.

2. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.

3. Non-corroding fasteners at in-swinging exterior doors.

4. Sound control openings: Use components tested as a system using nationally accepted standards by independent laboratories. Ensure that the door leafs have the necessary sealed-in-place STC ratings. Fasten applied seals over bead of sealant.

5. Fire-rated Doors, Resilient Seals: UL10C / UBC Standard 7-2 compliant. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements. Where rigid housed resilient seals are scheduled in this section and the selected door manufacturer only requires an adhesive-mounted resilient seal, furnish rigid housed seal at minimum, or both the rigid housed seal plus the adhesive applied seal. Adhesive applied seals alone are deemed insufficient for this project where rigid housed seals are scheduled.

6. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C / UBC Standard 7-2. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required

F. Automatic door bottoms: Low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when closer is disconnected.

G. Thresholds: As scheduled and per details. Comply with CBC Section 1133B.2.4.1. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.

1. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).

2. Fire-rated openings, 90min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.
3. Fire-rated openings, 3hour duration: Thresholds, where scheduled, to extend full jamb depth.
4. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.
5. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
6. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.

H. Exposed Through-Bolts: Do not use SNB, grommet nuts, sleeve nuts or other such clamping type fasteners, intent is for minimal exposed hardware. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.

I. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

2.7 FINISH:

A. Generally BHMA 626 Satin Chromium, BHMA 626AM Anti-microbial Satin Chrome.

1. Areas using BHMA 626 to have push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.

B. Door closers: Factory powder coated to match other hardware, unless otherwise noted.

C. Aluminum items: Match predominant adjacent material. Seals to coordinate with frame color.

2.8 KEYING REQUIREMENTS:

A. Key System: Existing system. Initiate and conduct meeting(s) with Owner to determine system structure needed to match the existing campus standard system. Furnish Owner's written approval of the system. For estimate figure Schlage Everest 29 XP with a restricted key way. Furnish temporary construction-keyed and permanent cylinders. Contractor to demonstrate to the Owner that temporary keys no longer operate the locking cylinders at the end of the project. Permanent keys and cores: use secured shipment direct from point of origination to Owner.

1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
2. For estimate: VKC stamping plus "Do Not Duplicate".

B. Bidding List: Use secured shipment direct from point of origination to Owner upon completion.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS:

A. Can read and understand manufacturers' templates, suppliers' hardware schedules and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION:

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation.

B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.
2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 30 inches to 44 inches above the finished floor, per CBC Section 1133B.2.5.1.
3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

C. Overhead stops: Before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.3 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Gaskets: Install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.

3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
4. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more that 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

D. Locate overhead stops for minimum 90 degrees and maximum allowable degree of swing.

E. Drill pilot holes for fasteners in wood doors and/or frames. Centerpunch hole locations before using self-drilling type screws to prevent skating. Replace screws that are not centered in their holes.

F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

3.4. ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.
2. Adjust doors to fully latch with no more than 1 pound of pressure.
3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
4. Adjust door closers per 1.9 this section.

B. Inspection: Use hardware supplier's consultant or consultant's agent. Include supplier's report with closeout documents.

C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:

1. Re-adjust hardware.
2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
3. Identify items that have deteriorated or failed.
4. Submit written report identifying problems

3.5 DEMONSTRATION:

A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

A. See door schedule in drawings for hardware set assignments.

B. No hardware shall be ordered until Finished Hardware has been reviewed and approved by Architect's hardware consultant.

C. Provide Factory order numbers for all products supplied on this project as part of close out documents for Owner's warranty records.

D. Any door count quantity shown in the HW set listings is for reference only. Contractor shall verify all door quantities with the Architectural Drawings.

E. Miscellaneous Material:

SpeXtra # 297260-1

Heading 01

1 PR Door F2033.1 SECURE CORRIDOR / PROCEDURE ROOM
INT UNEQUAL PAIR RATED 1/16" LEAD LINED PROCEDURE I/S

Each Assembly to have:

2	EA	CONT. HINGE	700	630	IVE
1	SET	AUTO FLUSH BOLT	FB32	630	IVE
1	EA	CLASSROOM LOCK	L9070L 06A XL11-515	630AM	SCH

1	EA	CYLINDER	CAMPUS STANDARD MORTISED CYLINDER WITH "L" CAM	626AM	TBD
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	FIRE/LIFE CLOSER	4414ME B80 WMS	689	LCN
2	EA	PLATE	4410-HSA-18G	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-NH-A	630	IVE
1	EA	MEETING STILE	44SP	SP	ZER

1/16" THICK LEAD LINING IN DOOR. SMOKE DETECTOR SUPPLIED AND FIRE ALARM TIE IN BY FIRE ALARM CONTRACTOR. DOOR MUST BE CONNECTED TO THE FIRE ALARM SYSTEM. OPERATION: DOOR NORMALLY CLOSED AND LATCHED. UNLATCHING AND OPENING ACTIVE LEAF UNLATCHES INACTIVE LEAF. DOORS WILL AUTOMATICALLY HOLD OPEN WHEN OPENED PAST 80 DEGREES AND WILL STAY OPEN AS LONG AS PEOPLE ARE IN THE OPENING (ADJUSTABLE UP TO 30 SECONDS) . DOOR AUTOMATICALLY CLOSE AFTER PEOPLE HAVE PASSED THRU THE OPENING.

Heading 02

1 SGL Door F2036.1 SECURE CORRIDOR / CONTROL ROOM
INT SGL HM X HM 90 MIN CONTROL RM

Each Assembly to have:

3	EA	HINGE	3CB1 HT 4.5 X 4.5	630	IVE
1	EA	CLASSROOM LOCK	L9070L 06A	630AM	SCH
1	EA	CYLINDER	CAMPUS STANDARD MORTISED CYLINDER WITH "L" CAM	626AM	TBD
1	EA	OH STOP	410S	630	GLY
1	EA	SURFACE CLOSER	4011 DEL	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-NH-A	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER

Heading 03

1 SGL Door F2033A.1 PROCEDURE ROOM / BI-PLANE EQ ROOM
INT SGK HM X HM RATED LEAD LINES BI-PLANE

Each Assembly to have:

3	EA	HW HINGE	3CB1HW HT 5 X 4.5	630	IVE
1	EA	CLASSROOM LOCK	L9070L 06A XL11-515	630AM	SCH

1	EA	CYLINDER	CAMPUS STANDARD MORTISED CYLINDER WITH "L" CAM	626AM	TBD
1	EA	SURFACE CLOSER	4111 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-NH-A	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER

1/16" THICK LEAD LINING IN DOOR

Heading 04

1 SGL Door F2035.1 PUBLIC CORRIDOR / STORAGE
INT SGL EXISTING OPENING BEING SECURED BY GC AND RELOCATED

Each Assembly to have:

1	SET	HARDWARE	HARDWARE IS EXISTING BEING REUSED

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for hollow metal frames, hollow metal doors wood doors store fronts and glazed aluminum curtain walls.

B. Exterior spandrel glass panels to match existing.

C. Description and procedure for all glass, including that provided by other sections, is indicated herein.

D. All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to specification Section 01 10 00.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary of Work.

B. Section 08 11 13 - Metal Doors and Frames.

C. Section 08 14 16 - Wood Doors.

1.03 REFERENCES

A. AAMA 800 - Voluntary Specifications and Test Methods for Sealants.

B. AAMA 850 - Fenestration Sealants Guide Manual.

C. AAMA TIR-A7 - Sloped Glazing Guidelines.

D. ANSI Z97.1 1984 (Safety Glazing).

E. ASTM C 509 - Elastomeric Cellular Preformed Gasket and Sealing Material.

F. ASTM C 542 - Lock Strip Gaskets.

G. ASTM C 716 - Specification for Installing Lock-Strip Gaskets and Infill Glazing Materials.

H. ASTM C 719 - Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement.

I. ASTM C 864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

J. ASTM C 920 - Specification for Elastomeric Joint Sealants.

K. ASTM C 1036 - Flat Glass.

L. ASTM C 1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

M. ASTM C 1115 - Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.

N. ASTM C 1172 - Laminated Architectural Flat Glass.

O. ASTM E 119 - Test Methods for Fire Tests of Building Construction.

P. ASTM E 152 - Methods of Fire Tests of Door Assemblies.

Q. ASTM E 163 - Fire Tests of Window Assemblies.

R. ASTM E 773 - Test Methods for Seal Durability of Sealed Insulating Glass Units.

S. ASTM E 774 - Sealed Insulating Glass Units.

T. ASTM E 1300 - Determining the Minimum Thickness of Annealed Glass Required to Resist a Specific Load.

U. FGMA Glazing Manual - 1990.

V. FGMA Sealant Manual - 1983.

W. GANA Publication.

X. NAAMM #SS-1B-68 - Nonskinning Resilient Preformed Compounds - Tapes, Ribbons, Beads with Release Paper.

Y. SIGMA Publications - TM3000 - Recommended Practices for Vertical and Basic Field Glazing of Organically Sealed Insulating Glass Units.

Z. Underwriters' Laboratories, Inc. (UL) and Warnock Hersey International (WHI), as applicable to fire rated hollow metal doors.

1.04 SUBMITTALS

A. Samples

1. Submit in accordance with Section 01 33 00.
2. Submit duplicate 6 inch x 6 inch Samples of glass specified. Each Sample shall bear manufacturer's label and shall state quality and thickness.

B. Certification: Submit certification that all glass in all locations is in accordance with ANSI Z97.1 1984.

1.05 DELIVERY STORAGE AND HANDLING

A. Cleaning

1. Refer to manufacturer's recommendations.
2. Avoid use of abrasive cleaners on all glass, but particularly on coated glass surfaces.

1.06 WARRANTY

A. Provide written warranty(ies) in accordance with Section 01 77 00.

B. Warranty

1. Provide for material replacement of hermetically sealed glass units which exhibit interpane dusting, condensation formation or misting within minimum period of 10 years.
2. Provide for material replacement of all glass that breaks due to unsatisfactory material and/or workmanship for a period of 10 years.
3. Provide for material replacement of coated glass which exhibit discoloration, delamination, loss of light transmission or reflectance, peeling, etc., within minimum period of 10 years.
4. Provide for replacement of laminated glass which exhibits edge separation, let-goes or delamination within a minimum period of 10 years.

1.07 MAINTENANCE

A. Submit maintenance data in accordance with Section 01 77 00. Include cleaning methods, cleaning solutions recommended, stain removal methods, etc.

1.08 PROJECT/SITE CONDITIONS

A. Field verify opening dimensions and opening conditions.

B. Existing Conditions

1. Prior to installation, the glazing contractor shall inspect all surfaces to receive glass so as to confirm a suitable substrate for the installation.
2. The glazing contractor shall verify plumbness, level and square corners for the openings to receive glass and shall inform the Architect of any deviations.

1.09 SEQUENCING AND SCHEDULING

A. Prior-to-Fabrication Conference

1. Well in advance of fabrication of structural glass, arrange a conference at the jobsite for the purpose of reviewing requirements and procedures for the manufacture/fabrication and installation of these materials, and satisfying any conditions which might interfere with the intended result.
2. Conference shall be attended by the Contractor, representatives of glass manufacturer/fabricator, glass installation subcontractor and Architect.

1.10 (NOT USED)

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS/FABRICATORS/GLASS

A. Float Glass (FG)

1. Basis of Design: Viracon, Inc.
2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

   a. PPG Industries
   b. Guardian Industries Corp.
   c. Pilkington

B. Insulating Glass (IG)

1. Basis of Design: Viracon, Inc.
2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

   a. J. E. Berkowitz
   b. Guardian Industries Corp.
   c. Interpane Glass Co.

C. Laminated Glass (LG)

1. Basis of Design: Viracon, Inc.
2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

   a. Globe Amerada Glass Co.
   b. Guardian Industries Corp.

D. Spandrel Glass (SG)

1. Basis of Design: Viracon, Inc.
2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

   a. Guardian
   b. Virginia Glass Products

E. Wire Glass (WG)

1. Basis of Design: Pilkington Glass, Ltd.
2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

    a. Central Glass
    b. Asahi
    c. Nippon

F. Tempered/Heat Strengthened Glass (TG/HG)

1. Basis of Design: Viracon, Inc.
2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

    a. Pilkington
    b. Guardian Industries Corp.

2.02 GLASS

A. Unless otherwise indicated, glass shall conform to ASTM C 1036 and ASTM C 1048, quality q3; type I (flat transparent) and class as applicable to the specific glass products listed herein.

B. Glass shall be products manufactured by the following, as applicable to the specification requirements of each type.

1. Products listed in the various glass types are the basis for design; corresponding products of other manufacturers listed above are acceptable provided basic appearance, function and performance characteristics are met.
2. Tinted or coated glass of each type throughout the project which is visually linked shall be a product of the same manufacturer whether provided under this Section or related Sections. Contractor shall be responsible for coordinating this aspect of the work.

C. Glass Schedule: Refer to architectural drawings.

D. Tempered Glass (TG): ASTM C 1048 - Equivalent heat treated float glass, of thickness noted. Manufacture/fabrication of horizontally tempered glass shall be such that "roller wave" is parallel to the bottom and top edges as installed.

1. Color: Clear

E. Insulating Glass (IG) (ICG): ASTM E 773, E 774, consisting of 1/4 inch float heat strengthened glass exterior lite; 1/2 inch air space; and 1/4 inch clear float glass interior lite. Provide tempered glass as required by ANSI Z97.1 1984. Lites of glass shall be separated by a 1/2 inch dessicant-filled metal spacer forming a dehydrated air space hermetically sealed at periphery with both primary and secondary sealants. Air space shall have three corners bent and one soldered. Sealants shall be compatible with glazing

gaskets and/or sealants used in installing glass. Provide Low E coating to surface 2 (coating on surface 3 is not acceptable).

2.03 GLAZING SEALANTS

A. Sealing and glazing materials shall be furnished and installed in accordance with manufacturer's instructions. Insure that sealants and glazing materials are compatible for their intended purposes. Materials shall comply with 1990 FGMA Glazing Manual and 1983 FGMA Sealant Manual guidelines except where they conflict with more current manufacturer's written recommendations; in which case the manufacturer's more current written recommendations shall govern.

B. Materials shall conform to the following specifications:

1.	Acrylic compounds:	AAMA 803.3
2.	Butyl compounds:	
	a. Skinning type	
	b. Nonskinning type	AAMA 809.2
3.	Polyurethane compounds:	
	a. One-part compounds	
	b. Two-part compounds	
4.	Silicone compounds:	
	a. One-part compounds	
	b. Two-part compounds	
5.	Dry elastomeric gaskets	
	a. Cellular (closed cell)	ASTM C 509
	b. Noncellular (dense)	ASTM C 864
6.	Narrow joint seams sealer	AAMA 803.3
7.	Preformed tape, noncuring type ductile back bedding glazing tape	AAMA 804.1
8.	Bonding type back bedding glazing tape	AAMA 806.1
9.	Cured rubber type glazing tape	AAMA 807.1
10.	Exterior perimeter sealing compound	AAMA 808.3
11.	Nondrying sealants	AAMA 809.2
12.	Expanded cellular glazing tape	AAMA 810.1
13.	Lockstrip gaskets, all types and materials	ASTM C 542

C. Manufacturers

1. Sealants

   a. Basis of Design: Pecora 895 Silicone Sealant
   b. Other Acceptable Manufacturers

      1) General Electric Silpruf
      2) Sonneborn Omni Seal

2. Gaskets

a. Tremco
b. Variseal

D. Setting blocks used to support glass shall be of a compatible elastomeric material (silicone, neoprene or EPDM) having 85 ±5 Shore A durometer hardness.

E. Edge blocks used for centering the glass and preventing lateral "walking" shall be of a compatible elastomeric material (silicone, neoprene or EPDM) having 65 ±5 Shore A durometer hardness.

F. Sponge gaskets shall be extruded of a compatible elastomeric material (silicone or black neoprene). Sponge gaskets shall be designed to provide 20% to 35% compression.

G. Dense gaskets shall be extruded of a compatible elastomeric material (silicone, black neoprene, or black EPDM) with a 75 ±5 Shore A durometer hardness for hollow profiles and 60 ±5 Shore A durometer hardness for solid profiles.

H. All gasket corners shall be molded where compatible with installation procedures.

PART 3 EXECUTION

3.01 GENERAL INSTRUCTIONS

A. All glass shall be held in proper plane and with the necessary face clearance by continuous glazing gaskets, tapes or wet glazing with spacers, using materials specified in Article 2.03. The glazing materials shall extend around the entire periphery and shall provide the specified resistance to air and water infiltration. All sealant and gasket materials shall be checked, for compatibility with the materials they contact, by the manufacturers of those materials and by the manufacturers of the sealant and gasket materials.

B. Setting blocks shall be placed in the positions as recommended by manufacturer and shall comply with FGMA Glazing Manual guidelines. Blocks shall be a minimum of 0.1 inch long per square foot of glass with a minimum of 4 inches. Width shall be at least the thickness of the unit and the height shall be at least 1/4 inch. Setting blocks shall be equidistant from the glass centerline. Location of setting blocks at quarter points of glass is acceptable. The distance from the vertical glass edge to the nearest edge of the setting block shall not be less than 6 inches or 0.125 times the glass width, whichever is greater.

C. Edge blocks shall be placed in the positions as recommended by manufacturer and shall comply with FGMA Glazing Manual guidelines. Edge blocks shall be a minimum of 4 inches long. A nominal 1/8 inch clearance should be allowed between the glass and blocks to allow for installation and glass sizing tolerances. Side blocks are not required where glass is continuously sealed with silicone at two or more edges.

D. Interior and exterior gasket profiles shall be designed to produce a glass edge pressure of not less than four (4) pounds per lineal inch nor more than ten 10 pounds per lineal inch. Gaskets or compatible tapes which maintain glass face clearance while serving as a backer for a silicone weather seal may have a friction fit. All other gaskets and weatherstrips, including backers for structural silicone, shall have a continuous spline or a continuous groove which engages a matching groove or leg on the aluminum frame.

3.02 CLEANING

A. After installation mark glass with X by using tape or removable paste.

B. Immediately remove droppings from finished surfaces. Remove labels after work is completed.

END OF SECTION 08 80 00

SECTION 09 29 00 - GYPSUM WALLBOARD SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non load bearing metal stud and metal furring system.

B. Gypsum wallboard partitions, soffits and ceilings.

C. Cement board.

D. Moisture-resistant gypsum board.

E. Bracing of partitions.

F. Insulation; acoustical, fire rated partition assembly.

G. Mechanical, electrical, stairway and elevator shaftwalls.

H. Accessories, such as corner beads, metal trim, control joints, fasteners, joint compound, joint tape, neoprene closures, sealer strips, adhesive, etc.

I. Bracing, blocking or attachment plates for wall supported items of equipment, hardware, etc.

J. Furring and wallboard as required or indicated to conceal exposed piping, ductwork and conduit.

K. Cold rolled steel channels, accessory clips, tie wires and hanger wires.

L. Enclosing of equipment penetrating fire rated ceilings.

M. Vapor barrier at exterior wall.

N. All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to specification Section 01 10 00.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary of Work.

B. Section 05 50 00 - Metal Fabrications: Metal access doors.

C. Section 06 10 00 - Rough Carpentry: Installation of frames.

D. Section 07 21 00 - Fibrous Batt Insulation: Thermal insulation and vapor barrier for exterior walls.

E. Section 07 84 13 - Fire-stop Systems: Sealant systems at fire rated and/or smoke partitions.

F. Section 07 92 00 - Sealants: Nonacoustic and nonrated.

G. Section 08 11 13 - Metal Doors and Frames: Supplying of frames.

H. Section 09 91 23 - Painting.

I. Section 10 28 00 - Toilet and Bath Accessories.

J. Division 15 - Mechanical: Metal access panels.

1.03 REFERENCES

A. GA 214 - Recommended Specification: Levels of Gypsum Board Finish

B. GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

C. GA 219 - Recommendations for Installation of Steel Fire Door Frames in Steel Stud - Gypsum Board Fire Rated Partitions.

D. GA 505 - Gypsum Board Terminology.

E. GA 600 - Fire Resistance Design Manual.

F. ANSI A17.1.

G. ANSI A108.11 - Specifications for Interior Installation of Cementitious Backer Units.

H. ANSI A118.9 - Test Methods and Specifications for Cementitious Backer Units.

I. ASTM C 11 - Terminology Relating to Gypsum and Related Building Materials and Systems.

J. ASTM C 36 - Standard Specification for Gypsum Wallboard.

K. ASTM C 423 - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

L. ASTM C 442 - Specification for Gypsum Backing Board and Coreboard.

M. ASTM C 473 - Methods for Physical Testing of Gypsum Board Products and Gypsum Lath.

N. ASTM C 475 - Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

O. ASTM C 630 - Specification for Water-Resistant Gypsum Backing Board.

P. ASTM C 645 - Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Applications of Gypsum Board.

Q. ASTM C 665 - Mineral Fiber Blanket Thermal Insulation.

R. ASTM C 754 - Specification for Installation of Steel Framing Members to Receive Screw attached Gypsum Wallboard.

S. ASTM C 834 - Specification for Latex Sealing Compounds.

T. ASTM C 840 - Specification for Application and Finishing of Gypsum Board.

U. ASTM C 919 - Practice for Use of Sealants in Acoustical Applications.

V. ASTM C 931 - Specification for Exterior Gypsum Soffit Board.

W. ASTM C 954 - Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

X. ASTM C 1002 - Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.

Y. ASTM C 1047 - Specification for Accessories for Gypsum Wallboard.

Z. ASTM C 1178 - Specification for Glass Mat Water-Resistant Gypsum Backing Board.

AA. ASTM E 90 - Laboratory Measurement of Sound Transmission Loss of Building Partitions.

BB. ASTM E 96 - Test Methods for Water Vapor Transmission of Materials.

CC. ASTM E 119 - Method for Fire Tests of Building Construction and Materials.

DD. ASTM E 152 - Method for Fire Tests of Door Assemblies.

EE. ASTM E 413 - Classification for Rating Sound Insulation.

FF. UL - Fire Resistance Directory.

1.04 SUBMITTALS

A. Submit manufacturer's product data and literature for installation of specified materials.

B. Provide Contractor's certification that all required rated assemblies are constructed in accordance with UL design tests or GA-600 including penetrations, door frames elevator doors and equipment, etc., and that all rated door openings meet ASTM E 152.

1.05 (NOT USED)

1.06 WARRANTY

A. Provide 2 year written warranty from Subcontractor in accordance with Section 01 77 00.

B. Repair and/or replace any cracking, loosening or other defects in the material or

workmanship of the wallboard systems during warranty period.

1.07 (NOT USED)

1.08 PROJECT/SITE CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 and GA 220 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40° F. (4° C.). For adhesive attachment and finishing of gypsum board, maintain not less than 50° F. (10° C.) for 48 hours before application and continuously after until dry. Do not exceed 95° F. (35° C.) when using temporary heat sources. Gypsum board shall not get wet.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

1.09 (NOT USED)

1.10 QUALITY ASSURANCE

A. Acoustic Attenuation for Interior Acoustic Partitions: As noted in the partition schedule in accordance with ASTM E 90.

B. Fire Rated Partitions: As noted in the partition schedule.

C. Fire Rated Ceiling: As noted on the drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design

1. Gypsum Wallboard and Accessories, U. S. Gypsum Co., Chicago, Illinois
2. Gypsum base/plaster, U. S. Gypsum Co., Chicago, Illinois
3. Metal Framing and Furring, Dietrich Industries Inc., Pittsburgh, Pennsylvania
4. "T" bar ceiling framing system, Armstrong
5. Cement Board, U. S. Gypsum Co., Chicago, Illinois
6. Shaftwall, U. S. Gypsum Co., Chicago, Illinois
7. Vapor Barrier, Griffolyn, Reef Industries, Inc.
8. Accessories, Fry Reglet Corp.

B. Other Acceptable Manufacturers Subject to Compliance with Requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

1. Gypsum Wall Board and Accessories

a. Domtar Gypsum

b. Georgia-Pacific Corp., Atlanta, Georgia
c. Gold Bond Building Products Division, National Gypsum Company, Charlotte, North Carolina

2. Metal Framing and Furring

a. Marino/Ware Industries, South Plainfield, New Jersey
b. Gold Bond Building Products Division, National Gypsum Company, Charlotte, North Carolina

3. "T" Bar Ceiling Framing System

a. U. S. Gypsum Co.

4. Cement Board

a. Domtar Gypsum
b. Glas-crete Inc., Bridgeport, New Jersey

5. Shaftwall

a. Domtar Gypsum
b. Georgia-Pacific Corp., Atlanta, Georgia
c. Gold Bond Building Products Division, National Gypsum Company, Charlotte, North Carolina

6. Vapor Barrier

a. Raven Industries, Springfield, Ohio

7. Accessories

a. Gordon, Inc.
b. MM Systems, Inc.
c. Pittcon Industries Inc.

2.02 METAL FRAMING

A. Provide metal framing materials in accordance with ASTM C 645 and C 754. Verify limiting heights and gauges of members of wall system with manufacturer's data and increase gauge if required. Use L/240 for gypsum board.

B. Steel Studs: G40 (G60 where subject to moisture), galvanized steel, 16 gauge, minimum .0179 (0.45 mm) uncoated steel thickness, sizes as noted on drawings.

C. Steel Studs and furring for cement board, ceramic tile walls, at jambs of all door openings, partitions supporting wall hung items of equipment and/or where noted on Drawings shall be G40 (G60 where subject to moisture), galvanized steel, 16 gauge, minimum .0329 (0.84 mm) uncoated steel thickness, sizes as noted on Drawings.

D. Shaftwall Studs: Type CH, G40 (G60 where subject to moisture), 16 gauge, sizes as noted on Drawings. Minimum stud size at stairs and elevator shafts shall be 4 inches (100 mm).

E. Runners: Galvanized steel G40 (G60 where subject to moisture).
1. Partition Top (not extending to structure) and Bottom: 1-1/4 inch (32 mm) leg, of

gauge and size to match studs.

2. Partition Top (to underside of structure): Deep leg (2-1/2 (64 mm) to 3 inches) (76 mm), minimum 16 gauge, of size to match studs.
3. Shaftwall: Type JR, 16 gauge, and JS 16 gauge, of size to match studs.
4. Top runners shall be 2 gauges heavier than the accompanying studs.

F. Steel Furring Members: Galvanized steel, G40 (G60 where subject to moisture), stud, 16 gauge, minimum .0179 (0.45 mm) uncoated steel thickness of sizes indicated on Drawings or as required structurally.

G. Ceiling Framing Materials

1. Carrying Channels: G40 (G60 where subject to moisture) Galvanized steel, 1-1/2 inch (38 mm) 16 gauge cold-rolled channels, lengths as required.
2. Furring: G40 (G60 where subject to moisture and under cement board) Galvanized steel, Type DWC (hat-shaped), 16 gauge, minimum .0179 (0.45 mm) uncoated steel thickness.
3. Hangers: 8 gauge galvanized steel wire.
4. In lieu of traditional carrying channel (black) iron and hat track, or stud and track suspension system, contractor may use suspended grid or "T-bar" construction. T-bar construction must meet all requirements of this specification and local codes. Systems shall meet minimum requirements of ASTM C 645 (Specification for Rigid Furring Channels for Screw Application of Gypsum Board): minimum G40 hot dipped galvanized coating and .0179 (0.45 mm) steel thickness before application of protective coating.

H. Fasteners and Anchorages: ASTM C 1002 as recommended by manufacturer and as required for loads. Exception: Use only low-profile head screws for steel-to-steel fasteners and Durock screws for Durock Cement Board.

2.03 METAL FRAMING ACCESSORIES

A. Adjustable Furring Brackets: 16 gauge galvanized steel.

B. Blocking: 16 gauge steel stud sections and/or ¼"-thick cold rolled steel plate, width to suit specific requirements.

C. Metal Angles: Sized as indicated on drawings, galvanized steel, 16 gauge.

D. Cold Rolled Channels: 16 gauge in 3/4 inch (19 mm) and 1-1/2 inch (38 mm) sizes, G40 (G60 where subject to moisture).

2.04 GYPSUM WALLBOARD

A. Provide gypsum wallboard materials in accordance with recommendations of GA 216 and as indicated on drawings. All board shall have tapered edges except where not available.

B. Gypsum Board

1. Comply with ASTM C 36.
2. 5/8 inch (16 mm) thick; Firecode; maximum available lengths.
3. 5/8 inch (16 mm) Firecode C only as required for assembly fire ratings.
4. Use sag-resistant type for ceilings.

C. Moisture Resistant Wall and Ceiling Board:

1. Comply with ASTM C 36, C 1396, E 136. C 473, D 3273
2. 5/8 inch (16 mm) thick Firecode Type X Sheetrock Brand Humitek Gypsum Panel

D. Cement Board - Cement Board for Locations Behind all Ceramic Wall Tile: 5/8 inch (16 mm) thickness by width and length to suit the installation with as few joints as possible glass fiber reinforced cement board. Indentation strength 2,300 psi per ASTM D 2394, water absorption 10% per ASTM C 473, fastener pull-through strength 125 lbs. (560 N) minimum per ASTM C 473. Apply over 16 inches (406 mm) o.c., G60 galvanized, 20 gauge (minimum .0329 (0.84 mm) uncoated steel thickness) framing only. Apply only with Durock screws 8 inches (200 mm) o.c. on walls and 6 inches (150 mm) o.c. on ceilings. Fasteners shall have Climaseal coating. Provide collars so fasteners won't crush board.

E. Where board is used as substrate for ceramic tile, materials used to finish joints must be compatible with tile setting materials.

F. GWB access panels shall be Glass Reinforced Gypsum (GRG) as manufactured by Chicago Metallic. Panels shall be drywall Access Door Series 8501 through 8505 as required for appropriate size.

2.05 (NOT USED)

2.06 GYPSUM WALLBOARD ACCESSORIES

A. Provide gypsum wallboard accessories in accordance with GA 216 and ASTM C 1047. All accessories shall be type to be finished with joint compound.

B. Corner Beads: Paper Faced Metal B1 Superwide Galvanized steel DUR-A-BEAD 103.

C. Edge Trim: Paper Faced Metal B9J Galvanized steel Sheetrock 200-A J-shaped casing bead.

D. Control Joints: Zinc control joint No. 093.

E. Sheetrock Paper Joint Tape, Joint Compound, Water, Fasteners: In accordance with ASTM C 475 and GA 216 and wallboard manufacturer's recommendations. Tape shall be recycled material. Joint compound shall be low VOC.

2.07 CEMENT BOARD ACCESSORIES

A. Durock tape and tile setting mortar as recommended by USG.

2.08 (NOT USED)

2.09 ACOUSTICAL/FIRE RATING ACCESSORIES

A. Resilient Channels: RC-1 Galvanized steel, 25 gauge.

B. Acoustical/Fire Rating Insulation: Preformed mineral fibers combined with thermosetting resins to comply with ASTM C 665 Type 1; friction fit type without integral vapor barrier

membrane; 3 inch (75 mm) thickness, as manufactured by USG, Thermafiber Sound Attenuation Fire Blankets (SAFB).

C. Acoustical Sealant: Type recommended for use in conjunction with gypsum board; Sheetrock Acoustical Sealant manufactured by USG. Comply with ASTM C 919.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Commencement of installation indicates acceptance of substrate.

3.02 METAL FRAMING ERECTION - GENERAL

A. Perform gypsum wallboard systems work in accordance with the manufacturer's recommendations, Gypsum Association Standards and applicable ASTM reference standards, whichever is more stringent.

B. Keep copies of GA 216, USG Gypsum Construction Handbook and applicable ASTM reference standards in field office for duration of project.

C. Erect metal framing in accordance with ASTM C 754 and C 840, and as modified herein.

D. Install members true to lines and levels to provide surface flatness with maximum variation of 1/8 inch (3 mm) in 10 feet (3050 mm) in any direction.

E. Do not attach runners, studs, bracing, or any other component of partition or ceiling system to ducts, pipes, equipment, etc. Attach only to building floors, walls or structural framing.

F. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support plumbing fixtures, toilet partitions, wall cabinets, handrails, shelving, toilet accessories, hardware including wall door stops, bumper rails, etc. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook".

3.03 METAL STUD ERECTION

A. Metal Runners

1. Where partitions are full height, secure bottom runner to floor construction and secure 2-1/2 (65 mm) to 3 inch (75 mm) deep leg top runner to structure above.
2. Where partitions are 6 inches (150 mm) above ceiling, secure to floor construction and to studs above ceiling, using 1-1/4 inch (32 mm) leg runners.
3. Where partitions are installed to ceiling, secure to floor and ceiling construction using 1-1/4 inch (32 mm) leg runners.

4. Where partitions are installed to solid horizontal substrate above, and gypsum board ceiling is furred down, secure 2-1/2 (65 mm) to 3 inch (75 mm) deep leg runner to horizontal substrate.

B. Metal Studs: Install at maximum 16 inches (400 mm) on center, or closer as indicated or required.

1. Where partitions are full height, secure to floor runner; do not secure to deep leg top runner unless wall is load bearing.
2. Where partitions run 6 inches (150 mm) above ceiling, secure to floor and top runners.

C. Door Opening Framing: Install double 20 gauge (minimum .0329 (0.84 mm) uncoated steel thickness) studs at door frame jambs with minimum of three "U" shaped strap anchors to join studs together. Run the double studs from floor to runner track at ceiling line. Install runners at frame head height between jamb studs. Perform work per recommendations of GA 219 for heavyweight doors.

D. Blocking/Attachment Plates: Bolt or screw steel blocking/attachment plates to studs.

E. Bracing: Provide diagonal bracing fabricated of metal studs spaced 48 inches (1200 mm) or as required by applicable code on centers on alternate sides of partitions, extending from top of partition and/or ceiling member to which partitions are attached to the underside of structure above.

F. Bridging: Install continuous horizontal metal channel bridging within stud cutout or on continuous stud attached to vertical studs (above ceiling) where partition height is excessive (over 10 feet) (2540 mm), or where partition is full height to structure above, or where there is additional surface loading on the gypsum wallboard, such as ceramic tile.

G. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work which are to be placed in or behind partition framing. Allow such items to be installed after framing is complete.

3.04 WALL FURRING INSTALLATION

A. Erect freestanding metal stud framing at 16 inches (400 mm) on center in accordance with manufacturer's directions. Provide wall furring brackets.

B. Provide metal stud or furring channels and wallboard to enclose all pipes, conduit, ducts, etc., exposed within finished spaces, whether or not such furring and wallboard is indicated on the Drawings.

3.05 FURRING FOR FIRE RATINGS

A. Install furring as required for fire resistance ratings. Install in accordance with UL Design Numbers indicated on Drawings.

3.06 CEILING FRAMING INSTALLATION

A. Coordinate location of hangers with other work. Use inserts, pig tail wire or other approved methods of anchoring hangers and suspension systems. Approved power-activated method of anchoring will be permitted; hanging from ducts, pipes, conduit and

other equipment will not be permitted.

B. Hanger wires shall be 8 gauge spaced at 48 inches (1200 mm) o.c. maximum along carrying channels and within 6 inches (150 mm) of ends of carrying channel runs.

C. Install ceiling framing independent of walls, columns, and above-ceiling work.

D. Space main 1-1/2 inch (40 mm) cold-rolled carrying channels at maximum 48 inches (1200 mm) on center, not more than 6 inches (150 mm) away from perimeter walls. Provide 1 inch (25 mm) clearance between ends of carrying channels and abutting walls or partitions. Lap splices minimum 12 inches (300 mm), interlock flanges and secure each end with double strand 18 gauge tie wire.

E. Place furring channels perpendicular to carrying channels at maximum 16 inches (400 mm) on center not more than 6 inches (150 mm) maximum from perimeter walls. Provide 1 inch (25 mm) clearance between ends of furring channels and abutting walls or partitions. Lap splices minimum 8 inches (2400 mm); nest furring and secure together at each end with double strand 18 gauge tie wire. Saddle tie furring channels to carrying channels with double strand 18 gauge tie wire.

F. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches (600 mm) past each end of openings.

G. Laterally brace entire suspension system where required.

H. Maximum permissible deflection of completed ceiling shall be 1/360 of span and maximum permissible surface deviation shall be 1/8 inch (3 mm) in 10 feet (300 mm) in any direction.

I. Install "T"-bar framing system in accordance with manufacturer's recommendations to meet load requirements and in accordance with ASTM C 754 (Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board). Acceptable System: USG or Armstrong World Industries Drywall Furring Systems.

3.07 SHAFTWALL INSTALLATION

A. Shaftwall: Elevator shafts, stairwells, mechanical shafts and as indicated shall be enclosed with cavity shaftwall system, fabricated of a layer or layers of fire-rated gypsum board applied vertically on one or both sides, screwed to "CH" studs retaining 1 inch (25 mm) shaft liner panel and set in "J" runners to form the required UL rated partition. In stairwells, extend finish sheet past structure. All components of the shaftwall system shall be of one manufacturer and installed as per appropriate UL tested design and manufacturers' printed directions. Provide bracing of wall where it exceeds 10 feet (300 mm) in height.

B. Provide "J-strut" (20 ga., 3 inch (75 mm) leg) reinforcing at jambs and headers of sliding door frames in hoistways; provide "E-stud" reinforcing at jambs and "J-strut" (20 ga., 3 inch leg) header at swinging door frames in stair enclosures. All doorway frames shall be UL labeled based on the appropriate ratings required of the wall construction. Install in accordance with GA 219 and ASTM E 152.

C. Meet requirements of ANSI A-17.1 at elevators.

D. Horizontal shaftwall assemblies shall be constructed in accordance with appropriate hourly rated WHI design (for mechanical shaft enclosures). and NER (National Evaluation Report) No. 258 (for corridor and stair soffits).

3.08 GYPSUM BOARD AND CEMENT BOARD INSTALLATION

A. Install gypsum board in accordance with GA 216, ASTM C 840, "fire rating requirements", manufacturer's instructions, whichever is more stringent as applicable. Extend gypsum board to height as indicated on drawing, either to 6 inches above the ceiling or full height to structure.

B. Apply all gypsum board as applicable in accordance with fire rating requirements for offsetting joints and screw spacing.

C. Protect gypsum board products from direct exposure to rain, snow, sunlight, or other excessive weather conditions.

D. Erect single layer gypsum board in nonfire rated partitions either horizontally with ends over framing or vertically with edges over framing. If run vertically, no exposed horizontal joints shall occur.

E. Erect single layer gypsum board in fire rated partitions vertically, with edges over framing.

F. For double layer partition applications, erect the first layer horizontally with all ends over framing. Erect the second layer vertically with edges over framing. Offset all joints of layers on opposite sides of partitions. No exposed horizontal joints shall occur.

G. Use screws to fasten gypsum board to steel furring or framing.

H. Do not terminate board against trim return.

I. Erect all gypsum board on ceilings perpendicular to framing with staggered end joints over supports.

J. Under all ceramic wall tile, erect 5/8 inch (16 mm) thick Durock Cement Board with as few joints as possible. Apply rough side out. Where ceramic tile is not full height of wall, top of cement board shall be 2 inches (50 mm) below top of ceramic. Embed 2 inch (50 mm) Durock interior tape in a skim coat of dry-set cement mortar over the joints and corners.

K. Water-Resistant Board: Treat cut edges and holes in water resistant gypsum board with sealant.

L. Location of control joints shall be consistent with lines of building spaces, in consistent pattern and as directed by Architect at 30 feet (9000 mm) o.c., maximum except provide control joints strike side of door frame on both sides of partition, extending from top of frame to 6 inches (150 mm) above ceiling.

M. Corners and Edges: Place corner beads at exposed external corners. Use longest available lengths. Place edge trim where gypsum board abuts dissimilar materials in exposed locations.

N. Joints/Gypsum Wallboard: Tape, fill, finish and sand joints, fasteners, corners, metal trim flanges, to produce surface free of visual defects ready to receive surface finishes. Full finishing MUST extend behind base to floor. Tape and fill all joints in concealed locations. Treat all fastener heads in concealed locations with one coat of joint compound.

O. Joints/Cement Board: Tape, fill, finish joints, corners, etc., to produce surface ready to receive surface finish. Full finishing MUST extend behind base to floor. Material shall be tile setting mortar with cement board tape, it shall NOT be sheetrock joint compound and paper tape.

P. Remove and redo defective work.

Q. Vapor Barrier: On interior face of studs occurring at exterior walls and at showers, install vapor barrier prior to installation of gypsum board. Vapor barrier width shall be height of wall and shall be fastened securely to the studs. Length shall be one continuous roll. Lap all joints a minimum of 12 inches (300 mm) and seal. Patch and seal all tears or openings. The intent is to completely seal the building envelope.

1. Extend vapor barrier to extremities of areas to be protected from vapor transmission. Secure in place with mechanical fasteners or adhesives. Extend vapor barrier to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.
2. Seal vertical joints in vapor barriers over framing by lapping not less than 2 wall studs. Fasten vapor barriers to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners 16 inches (400 mm) o.c.
3. Seal joints in vapor barriers caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barriers with vapor retarder tape.
4. Repair any tears or punctures in vapor barrier immediately before concealing it with the installation of gypsum board or other construction.

R. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2 where panels form substrates for tile.
3. Level 3 for gypsum board surfaces receiving medium or heavy textured finishes before painting and for surfaces receiving heavy-duty wall coverings where lighting conditions are not critical.
4. Level 4 for gypsum board surfaces, unless otherwise indicated.
5. Level 5 for gypsum board surfaces receiving gloss and semigloss enamels and nontextured flat paints and where light shines on the gypsum board accentuating the joints and fasteners. Include "Sheetrock First Coat" primer. Contractor has option of USG sheetrock brand primer-surfacer Tuff Hide.

3.09 (NOT USED)

3.10 ACOUSTICAL ACCESSORIES INSTALLATION

A. Place acoustical/fire rating insulation in partitions tight within framing spacing, around

cut openings, behind and around electrical and mechanical items within or behind partitions and tight to items passing through partitions.

B. Place acoustical sealant within partitions in accordance with manufacturer's recommendations and ASTM C 919. Install acoustical sealant at entire gypsumboard perimeter. Apply one minimum 1/4 inch (6 mm) bead on each side of partition to be in contact with board edge, framing and abutting surface. Caulk all nonfire stopped penetrations of nonrated partitions by conduit, pipe, ductwork, rough-in boxes and all other items. Such penetrations of rated partitions shall be sealed under Section 07 84 13.

3.11 (NOT USED)

3.12 (NOT USED)

END OF SECTION 09 29 00

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SECTION 09 51 13 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Related Sections include the following:

1. Division 01 Section "Product Requirements".

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 DEFINITIONS

A. AC: Articulation Class

B. CAC: Ceiling Attenuation Class

C. LR: Light Reflectance coefficient

D. NRC: Noise Reduction Coefficient

1.4 PREINSTALLATION MEETINGS

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of full-size Samples of each type, color, pattern, and texture.
2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch long Samples of each type, finish, and color.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.

a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
4. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).
5. All installation details, including materials utilized, being provided to meet seismic requirements.

B. Qualification Data: For installer and testing agency.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

1. Certification of Compliance to UL Classification to acoustic categories - NRC, CAC and AC where applicable.
2. Certification of compliance with seismic requirements.

D. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type, from ICC-ES.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

B. Executed warranty

1.8 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.

B. Installer Qualifications: Installer with at least 5-years of experience erecting ceilings of the type specified and is acceptable to the ceiling and grid manufacturer(s).

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use. Maintain temperature and humidity as recommended by specified manufacturers.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.11 WARRANTY

A. A6: The acoustical ceiling shall be warranted by the manufacturer for a period of ten years against sagging, warping, or shrinkage in conditions up to 70% relative humidity subject to normal allowable average manufacturing tolerances. The subcontractor shall be responsible for any replacement.

B. A14: The acoustical ceiling shall be warranted by the manufacturer for a period of one year against sagging, warping or shrinkage in conditions up to 70% relative humidity subject to normal allowable average manufacturing tolerances. The subcontractor shall be responsible for any replacement.

1.12 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.13 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

1.14 MANUFACTURER'S RECYCLING PROGRAM

A. Manufacturer of ceiling tile shall have an established material reclamation and recycling program including:

1. Job site reclamation of existing ceiling tile materials.
2. Use of both preconsumer and post-consumer recycled materials in production of the ceiling tile.
3. Provisions for reclamation of material supplied for this project at the end of its useful life.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to specification Division 01 Section "Summary."

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.

2.2 ACOUSTICAL PANELS, GENERAL

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

E. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Basis of Design: Armstrong World Industries, Inc.

B. Other Acceptable Manufacturers/Products subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not

listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

1. Decoustics
2. Ecophon CertainTeed, Inc.
3. Hunter Douglas Contract
4. USG Interiors, Inc.

C. Acoustical Ceiling Types

Type A6. Match Existing ACT
Surface hardness: Provide a minimum value of 100 lb. when tested in accordance with ASTM C 367.
Size: 24 inch x 24 inch x 3/4 inch
Grid Size: 15/16
Minimum UL certified acoustic values:
LR: 0.85
NRC: 0.65
CAC: 35

D. Color: White unless noted otherwise.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 12 gauge wire (0.105 inch diameter).

E. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

F. Clean-Room Gasket System: Where indicated, provide manufacturer's standard system, including manufacturer's standard gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.

2.5 SUSPENSION SYSTEM

A. Basis of Design: Armstrong World Industries

B. Other Acceptable Manufacturers subject to compliance with requirements:

1. United States Gypsum Corporation
2. Chicago Metallic Corporation

C. Type conforming to ASTM C 635 intermediate duty system.

D. Grid: Nonfire-rated, hot-dipped galvanized exposed tee (except where noted otherwise); all components die cut and interlocking and rotary stitched.

1. Armstrong Prelude XL 15/16 inch exposed tee system - for ceiling Type A6.
2. Armstrong AL Prelude Plus 15/16 inch exposed aluminum tee system, white paint finish - for ceiling Type A14. Aluminum (in accordance with ASTM B 211) shall have a minimum of 50% recycled content, shall be installed in rooms 113, 114, 122, 122A, and 125.
3. Armstrong Drywall Furring System.

E. Accessories: Stabilizer bars, furring clips, splices and edge moldings as required to complete and complement suspended ceiling grid system. 15/16 inch edge trim shall be hot dipped galvanized angle moulding.

F. Materials/Finish: Commercial quality cold rolled steel hot dipped galvanized; paint finish on exposed surfaces to match ceiling.

G. Carrying Channels and Hangers: Galvanized steel; size and type to suit application and to rigidly secure the complete acoustic unit ceiling system, with maximum deflection of 1/360. Hangers shall be minimum 12 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this

and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Perform ceiling system work in accordance with the recommendations of ASTM C636, California Building Code, CISCA Recommendations For Direct-Hung Acoustical Tile and Lay-In Panel Ceilings, Seismic Zones 0-2 dated May, 2004 and ASTM E580 (or as herein specified if more stringent). Keep copies of these documents in field office for the duration of project.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
3. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 24 inches from ends of each member.
9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Supply hangers or inserts for installation to the respective section in ample time and with clear instructions for their correct placement. Provide additional hangers and inserts as required.

E. Use inserts, pigtail wire or other approved methods of attaching hangers and suspension systems. Approved powder driven type method of attaching will be permitted. Hanging from ducts, pipes and other equipment will not be permitted.

F. Hang independently of walls, columns, ducts, pipes, conduit, etc. Where carrying members are spliced, avoid visible displacement of the longitudinal axis or face plane of adjacent members.

G. Except where specifically dimensioned otherwise, center ceiling system(s) on room axis leaving equal border pieces. Border pieces of tile with score lines shall visually be no less than 6 inches. Install ceiling systems per reflected ceiling plans where included.

H. Recessed lighting fixtures will be supported with clips from or on main runners or cross runners; support these fixture loads by providing supplementary hangers located within 6 inches of each corner of fixture. Should additional support be required to prevent deformation of ceiling system, such supports will be provided under Division 26.

I. Air diffusers/grilles/registers will be supported by the grid system with clips from or on main runners or cross runners; support these fixture loads by providing supplementary hangers located within 6 inches of each corner of fixture. Should additional support be required to prevent deformation of ceiling system, such support will be provided under Division 23.

J. Do not permit installation of other fixtures that cause main runners and cross runners to be eccentrically loaded. Where such fixture installation produces rotation of runners, provide stabilizer bars.

K. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
4. Where bullnose concrete block corners occur, provide preformed closers to match edge molding.

L. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

M. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

3. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.
6. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.
8. Form expansion joints within system. Form to accommodate plus or minus 1/2 inch movement and maintain visual closure.

N. Suspended acoustic ceilings greater than 144 square feet in area shall be installed as unrestrained ceilings in accordance with CISCA recommendations.

O. Connections to all equipment, devices, fixtures, grilles, registers, diffusers and other appurtenances mounted in the ceilings shall be flexible so that they do not restrict the movement of the unrestrained ceilings. The ceilings must be "free-floating" and the flexible connections must allow for a minimum free movement of the ceiling system of 3/8" in all directions.

P. Terminal ends of main runners and cross members shall be tied together or have some other approved means to prevent their spreading; spreader bars, strut stabilizers or similar devices used to tie ends of main runners and cross members together to prevent their spreading shall occur within 8" of each wall or other structure which may penetrate the ceiling.

Q. The terminal ends of suspension members, both main runners and cross runners, shall have a minimum of 3/8" clearance from the wall.

R. Permanent runner end attachment (e.g., pop rivets) for grid alignment purposes shall not be permitted.

S. Allow for ceiling movement at rigid penetrations through ceiling tiles such as sprinkler piping, columns and exhaust duct drops by providing an oversized hole in the ceiling tile. Provide suitable escutcheons or closure details to cover gaps from view.

T. Ceiling suspension system hanger wires shall be provided at all four corners of all light fixtures.

U. Lighting fixtures weighing less than 10 lb shall have one no. 12 gauge safety wire connected from the fixture housing to the structure above. It is not necessary for these safety wires to be taut.

V. Lighting fixtures weighing greater than 10 lb but less than 56 lb shall have, in addition to the requirements outlined above, two no. 12-gauge hanger wires connected from the fixture housing (not the detachable end plates) to the structure above that act as safety wires. It is not necessary for these safety wires to be taut.

W. Lighting fixtures weighing 56 lb or more shall be supported directly from the structure above by approved hangers.

X. Pendant-hung lighting fixtures shall be supported directly from the structure above using no less than no. 9-gauge wire or an approved alternate support. The ceiling suspension system shall not provide any direct support.

Y. Rigid conduit shall not be used for attachment of the fixtures.

Z. Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing less than 20 lb shall be positively attached to the ceiling suspension main runners or to cross runners that have the same carrying capacity as the main runners.

AA. Flexible sprinkler hose fittings, air terminals or other services weighing more than 20 lb but less than 56 lb shall have, in addition to the above requirements, two no. 12-gauge hanger wires connected from the terminal or service to the ceiling system hangers or to the structure above that act as safety wires. It is not necessary for these wires to be taut.

BB. Flexible sprinkler hose fittings, air terminals or other services weighing more than 56 lb shall be supported directly from the structure above by approved hangers.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Compliance of seismic design.

B. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.

1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.

a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.

b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

C. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 ADJUSTMENTS

A. Adjust any sags or twists which develop in the ceiling system(s) and replace any part which is damaged or faulty.

END OF SECTION 09 51 13

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SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resilient base
2. Resilient molding accessories

B. Related Sections:

1. Division 01 Section "Product Requirements."
2. Division 09 Section "Resilient Flooring" for resilient
3. Division 09 Section "Tile Carpeting"

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include product data specific to resilient accessory adhesives for each specified product.

B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Provide Architect with test procedure or ASTM number, required results for acceptability accompanied by actual test results (from independent testing laboratory where required), and certification from manufacturer that substrate is acceptable for installation of their materials. Tests include:

1. Moisture test - ASTM F 1869 (Calcium Chloride Test)
2. ASTM F 710
3. ASTM F 2170
4. pH level test
5. Adhesive bond test

B. Provide certification slip resistance compliance for all walking surfaces along with test data from an independent testing laboratory in accordance with ASTM C 1028.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648, E662 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. If required by documents, provide types of resilient flooring and accessories supplied by one manufacturer for color matching.

1.6 GUARANTEE/WARRANTY

A. Special Warranty: Provide written warranty from manufacturer and Subcontractor in accordance with Division 01 "Product Requirements" and "Closeout Procedures". All materials shall be warranted for 2 years against manufacturing defects. The subcontractor shall be responsible for any replacement and for defective installation.

1.7 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 degrees F or more than 96 degrees F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation
2. During installation
3. Until Substantial Completion

B. Ensure concrete floors' pH levels do not exceed the written recommendations of the resilient flooring manufacturer and/or the adhesive manufacturer. Refer to resilient flooring manufacturer's written instructions for guidelines on acceptable pH levels.

C. Ensure concrete floors to receive resilient flooring are free of coatings, finishes, dirt, curing compounds, or other substances which may affect the rate of moisture dissipation from the concrete or the adhesion of resilient flooring to the concrete.

D. Install resilient flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.

E. It is the Contractor's responsibility to provide acceptable measures to provide a substrate acceptable to the flooring manufacturer and installer.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base, Basis of Design: Roppe Corporation, USA

B. Other Acceptable Manufacturers: Subject to compliance with requirements:

1. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
2. Flexco, Inc.
3. Johnsonite
4. VPI, LLC; Floor Products Division

C. Resilient Base Standard: ASTM F 1861

1. Material Requirement: Type TS (rubber, vulcanized thermoset)
2. Manufacturing Method: Group I (solid, homogeneous)
3. Style: Cove (base with toe) for resilient flooring and Straight (flat or toeless) for carpet.

D. Minimum Thickness: 0.125 inch.

E. Height: 6 inches.

F. Lengths: One piece per surface.

G. Outside Corners: Job formed.

H. Inside Corners: Job formed.

I. Finish: Low luster.

J. Colors and Patterns: As indicated on Finish Schedule. Match Architect's sample.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory, Basis of Design: Johnsonite.

1. Manufacturers: Subject to compliance with requirements:

a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
b. Flexco, Inc.

c. Roppe
d. VPI, LLC; Floor Products Division

B. Description: Reducer strip for resilient floor covering.

C. Material: Rubber

D. Profile and Dimensions: Johnsonite SSR-XX-B 1/8 reducer strip for VCT to sealed concrete. SLTC-XXX-A 1/9 reducer strip for carpet to VCT.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Rubber Floor Adhesives: Not more than 60 g/L.

C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Treads and Accessories: Ensure substrate surfaces are smooth, flat, and acceptable substrate. Prepare according to ASTM F 710. Commencement of installation indicates acceptance of substrate(s).

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Perform an adhesive bond test, as recommended by the resilient flooring manufacturer, on subfloors to determine if surfaces are dry; free of curing and hardening compounds, old adhesive and any other coatings; and ready to receive resilient flooring.
3. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
4. Alkalinity and Adhesion Testing: Perform pH test for alkalinity prior to the installation of resilient flooring. pH levels shall not exceed the written recommendations of the resilient flooring manufacturer and/or the adhesive manufacturer. Refer to resilient flooring manufacturer's written instructions for guidelines on acceptable pH levels.
5. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Form without producing discoloration (whitening) at bends and to be continuously tight to substrates.
2. Inside Corners: Use straight pieces of maximum lengths possible and mitre corner end pieces to fit tightly.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Commencement of installation indicates acceptance of substrate.

B. Comply with manufacturer's written instructions for installing resilient accessories.

C. Resilient Stair Accessories:

1. Use epoxy stair-tread-nose filler in accord with manufacturer's recommendations to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. Lightly sand back of each tread to remove any foreign material and improve bond strength.
4. For treads installed as separate, equal-length units, install to produce a flush joint between units.

D. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

3.6 WASTE MANAGEMENT

A. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for reuse:

B. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated, fire-safe area at moderate temperature.

END OF SECTION 09 65 13

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SECTION 09 65 16 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section Includes:

1. Vinyl composition floor tile.

C. Related Sections:

1. Division 01 Section "Product Requirements."
2. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include product data specific to resilient flooring adhesives for each specified product.

B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. With product data for each floor finish material specified, manufacturer shall provide slip resistance data from tests performed by an independent testing agency in accordance with ANSI A 1264.2 dry and NFSI 101A wet for coefficient of friction.

D. Samples for Verification: In manufacturer's standard size, but not less than 12 x 12 sections of each different color and pattern of floor covering required.

E. Product Schedule: For floor coverings. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Provide Architect with test procedure or ASTM number, required results for acceptability, accompanied by actual test results (from independent testing laboratory where required), and certification from manufacturer that substrate is acceptable for installation of their materials. Tests include:

1. Moisture test – ASTM F 1869 (Calcium Chloride Test)

2. ASTM F 710
3. ASTM F 2170
4. pH level test
5. Adhesive bond test

B. Provide certification of ADA slip resistance compliance for all walking surfaces along with test data from an independent testing laboratory in accordance with ANSI A 1264.2 dry and NFSI 101A wet. In the absence of certified third party testing, tests shall be performed on the completed installed floor surface AFTER the final polish is applied.

C. Qualification Data: For qualified Installer.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor covering to include in maintenance manuals.

B. Executed warranty

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor coverings during the following time periods:

1. 48 hours before installation
2. During installation
3. 48 hours after installation

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

1.7 WARRANTY

A. Flooring Manufacturers Standard Warranty: Manufacturer warrants that flooring products will be free from defects for a period of two-years from date of substantial completion.

B. Flooring Installers Warranty: Installer warrants that the flooring installation will be free from defects in workmanship for a period of two years for the date of substantial completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Covering: Furnish quantity not less than 10% of each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN MANUFACTURER PRODUCTS AND LEAD TIMES:

A. Products listed as Basis of Design herein and on the Finish Schedule have been coordinated with other finishes and approved by the Owner for color and pattern in schemes throughout the project area.

B. Proposed substitutions must be approved by the Owner and Architect prior to award or they will not be considered. The Contractor shall be responsible to match all listed characteristics, including color and pattern, to the satisfaction of the Owner and Architect. Submit products for consideration per the requirements of Division 01 Section "Substitution Procedures."

C. Substitutions for Cause proposed after award shall be submitted for approval per the requirements of Division 01 Section "Substitution Procedures." Substitutions for Convenience proposed after award will not be considered.

D. Many Division 09 products are long lead. The Contractor is responsible to verify all lead times sufficiently in advance of submittal documents, mockups and need to avoid schedule conflicts. Neither the Owner nor Architect will be held responsible for inaction on the part of the Contractor in ordering material with enough lead time to avoid additional "quick ship" costs or delays to the construction schedule in order to accomplish all requirements herein.

2.2 VINYL COMPOSITION FLOOR TILE

A. Products:

1. Basis of Design: Armstrong World Industries, Inc.; Standard Excelon.
2. Other Acceptable Manufacturers subject to compliance with requirements:

a. Mannington Mills, Inc.; Mannington Commercial Essentials.

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: See Finish Schedule.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

C. Floor Polish: Provide protective floor polish products as recommended by manufacturer

2.4 ADA COMPLIANCE

A. All flooring in wet condition shall be in accordance with ADA recommendation for slip resistance, COF of 0.6 for level surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor coverings until they are same temperature as space where they are to be installed.

1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis in pattern indicated on drawings.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction and in pattern of colors and sizes indicated.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.

B. Perform the following operations immediately after completing floor covering installation:

1. Remove adhesive and other blemishes from floor covering surfaces
2. Sweep and vacuum floor coverings thoroughly
3. Damp-mop floor coverings to remove marks and soil

C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive and surface blemishes from floor covering before applying floor polish.

1. Apply five coats.

E. Cover floor coverings until Substantial Completion.

END OF SECTION 09 65 16

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Concrete masonry units (CMU).
3. Gypsum board.

1.3 DEFINITIONS

A. Gloss Levels:

1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, Flat, according to ASTM D 523.
2. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, Egg Shell, according to ASTM D 523.
3. Gloss Level 5: 35 to 70 units at 60 degrees, Semi-Gloss according to ASTM D 523.

B. Finished Spaces: are all spaces or rooms throughout the area of construction, except spaces above suspended ceilings, unless otherwise specified or noted.

C. Finish Schedule: The Finish Schedule lists interior finishes for project, including paint, and can be found on the drawings. The Finish Schedule will indicate paint type, color and gloss for the project. Additional finish information may be found elsewhere on the drawings.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.

4. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Coating Maintenance Manual: Upon conclusion of the project, furnish a maintenance manual which shall include an area summary with finish schedule, paint color and gloss samples, where used, product data, MSDS sheets, care & cleaning instructions and touch up procedures.

B. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation, VOC content and instructions for mixing and/or reducing.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

C. Include precautionary measures to prevent fire hazards and spontaneous combustion in the approved Site Specific Safety Manual and post in the paint storage area.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

1. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures between 50 and 95 degrees for 24 hours before, during and 48 hours after application of finishes.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Provide a minimum 25 foot candles (270 lux) of lighting on surfaces to be finished.

1.8 WARRANTY

A. Provide a one year written warranty from painting subcontractor covering defects in material and workmanship. Areas deemed to be defective shall be repaired as required to make the repair indiscernible.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Sherwin Williams Company (SW)
2. Benjamin Moore (BM)
3. Dunn Edwards

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: Color selections have been made from color charts published by the manufacturer(s) listed in the Finish Schedule; contractor shall match these colors without exception.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner will direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove non-complying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Existing Surfaces: Where existing painted surfaces are scheduled to be painted, prepare as follows:

1. Remove dirt, mold, mildew and other contaminates per manufacturer's instructions.

2. Lightly sand entire surface to be painted.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Paint Primed and Exposed Steel including, but not limited to, the following:

1. Exposed steel stair work
2. Steel hand railings and supports
3. Interior metal doors and frames.
4. Bumper guards and angles at loading docks
5. Steel channel jambs
6. Drapery and blind pockets
7. Steel bollards
8. Chain link and wire mesh partitions.
9. Catwalks
10. Ladders
11. Exposed metal without a finish coat.

E. Paint exposed structural steel and deck scheduled for painting (except shop priming).

1. Do not prime steel surfaces scheduled for the application of applied fireproofing materials.

F. Painting of Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Equipment, including panel boards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.

e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.
h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
i. Other items as indicated.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panel boards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as indicated.

3. Paint portions of internal surfaces (black) of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
4. Paint both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment.
5. Color banding and identification (flow arrows, naming, numbering, etc.) are provided by the Division 21, 22, 23, 25, 26, 27 and 28 Contractors.
6. Do not paint or in any way obscure certification or identification labels on any material or equipment.

G. When painting operating units, paint shall not be applied to sliding or rolling contacts where bare material is necessary for proper operation. Paint applied to such surfaces shall be removed.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE (INTERIOR- LOW VOC LATEX PAINTS): The paragraphs below cover a range of painting systems. The Contractor shall consult the Finish Schedule and drawings for paint location, type, gloss and color to be applied to each individual substrate. Not all scheduled systems will be included on the Finish Schedule. Where the product line permits, provide products from a sole source single manufacturer.

A. Concrete (Non-Traffic) Substrates: Consult Finish Schedule for gloss.

1. Institutional Low-Odor/VOC Latex System; Flat (Gloss Level 1).

a. 1 Coat Primer: Primer sealer, latex, interior.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Eco Spec WB Interior Latex Primer
b) SW ProMar 200 Zero Interior Latex Primer
c) Dunn Edwards Vinylastic

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Flat.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Flat (N536)
b) SW ProMar 200 Interior Latex Flat (B30W2500).
c) Dunn Edwards Spartazero Latex Flat

2. Institutional Low-Odor/VOC Latex System; Eggshell (Gloss Level 3).

a. 1 Coat Primer: Primer sealer, latex, interior.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Primer
b) SW ProMar 200 Zero Interior Latex Primer
c) Dunn Edwards Vinylastic.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Egg Shell.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Egg Shell
b) SW ProMar 200 Zero VOC Interior Latex Egg Shell
c) Dunn Edwards Spartazero latex Egg Shell.

3. Institutional Low-Odor/VOC Latex System; Semi-Gloss (Gloss Level 5).

a. 1 Coat Primer: Primer sealer, latex, interior.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Primer
b) SW ProMar 200 Zero Interior Latex Primer
c) Dunn Edwards Spartazero.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Semi-Gloss.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 Zero VOC Interior Semi-Gloss.
b) SW ProMar 200 Zero VOC Acrylic Semi-Gloss.
c) Dunn Edwards Spartazero Latex Semi-Gloss.

4. Existing Painted Surfaces:

a. Apply one coat low VOC primer product as recommended by the manufacturer compatible with painted substrate and specified topcoat.
b. Apply two coats specified topcoat.

B. CMU Substrates: Consult Finish Schedule for gloss and color.

1. Institutional Low-Odor/VOC Latex System Flat (Gloss Level 1):

a. 1 Coat Block Filler: Block filler, latex, interior/exterior. Contractor shall apply two (2) coats block filler in high humidity areas (greater than 60%), kitchen/food prep areas, labs and clean rooms.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Super Spec High Build Interior Block Filler
b) SW PrepRite Interior Block Filler
c) Dunn Edwards, Smooth Blocfil Select.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Flat.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Flat
b) SW ProMar 200 Interior Latex Flat.
c) Dunn Edwards Spartazero Latex Flat.

2. Institutional Low-Odor/VOC Latex System Eggshell (Gloss Level 3):

a. 1 Coat Block Filler: Block filler, latex, interior/exterior.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Super Spec High Build Interior Block Filler
b) SW PrepRite Interior Block Filler
c) Dunn Edwards, Smooth Blocfil Select.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Egg Shell.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Egg Shell
b) SW ProMar 200 Zero VOC Interior Latex Egg Shell
c) Dunn Edwards Spartazero Latex, Egg Shell.

3. Institutional Low-Odor/VOC Latex System Semi-gloss (Gloss Level 5):

a. 1 Coat Block Filler: Block filler, latex, interior/exterior.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Super Spec High Build Interior Block Filler.
b) SW PrepRite Interior Block Filler.
c) Dunn Edwards, Smooth Blocfil Select.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Semi-Gloss.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 Zero VOC Interior Semi-Gloss.
b) SW ProMar 200 Zero VOC Acrylic Semi-Gloss.
c) Dunn Edwards Spartazero Latex Semi-Gloss.

4. Existing Painted Surfaces:

a. Apply one coat low VOC primer product as recommended by the manufacturer compatible with painted substrate and specified topcoat.
b. Apply two coats specified topcoat.

C. Gypsum Board Substrates: Consult Finish Schedule for gloss.

1. Institutional Low-Odor/VOC Latex System; Gloss Level 1; Flat:

a. 1 Coat Primer: Primer sealer, latex, interior, Flat (Gloss Level 1).

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Eco Spec WB Interior Latex Primer
b) SW ProMar 200 Zero Interior Latex Primer
c) Dunn Edwards Vinylastic.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Flat.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Flat
b) SW ProMar 200 Interior Latex Flat.
c) Dunn Edwards Spartazero Latex Flat.

2. Institutional Low-Odor/VOC Latex System; Gloss Level 3; Eggshell:

a. 1 Coat Primer: Primer sealer, latex, interior Gloss Level 1; Eggshell (Gloss Level 3).

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 WB Interior Latex Primer
b) SW ProMar 200 Zero Interior Latex Primer
c) Dunn Edwards Vinylastic.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Egg Shell.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Eco Spec WB Interior Latex Egg Shell
b) SW ProMar 200 Zero VOC Interior Latex Egg Shell
c) Dunn Edwards Spartazero Latex Egg Shell.

3. Institutional Low-Odor/VOC Latex System; Gloss Level 5; Semi-Gloss:

a. 1 Coat Primer: Primer sealer, latex, interior, Semi-Gloss (Gloss Level 5).

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Eco Spec WB Interior Latex Primer
b) SW ProMar 200 Zero Interior Latex Primer
c) Dunn Edwards Vinylastic.

b. 2 Coats Topcoat: Latex, interior, institutional low odor/VOC, Semi-Gloss.

1) Acceptable Product: Subject to compliance with requirements, provide the following:

a) BM Ultra Spec 500 Zero VOC Interior Semi-Gloss.
b) SW ProMar 200 Zero VOC Acrylic Semi-Gloss.
c) Dunn Edwards Spartazero Latex Semi-Gloss.

2) Semi-Gloss and Gloss products applied over Gypsum Drywall require a level 5 finish. Coordinate with Division 09 Section Gypsum Board Systems Contractor before proceeding.

4. Existing Painted Surfaces:

a. Apply one coat low VOC primer product as recommended by the manufacturer compatible with painted substrate and specified topcoat.
b. Apply two coats specified topcoat.

END OF SECTION 09 91 23

SECTION 10 11 00 - VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tackboards, and markerboards, trim and attachment hardware.

B. All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to specification Section 01 10 00.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary of Work.

B. Section 06 10 00 - Rough Carpentry: Wood grounds.

C. Section 09 29 00 - Gypsum Wallboard System.

1.03 REFERENCES

A. ASTM A 424 - Steel Sheets for Porcelain Enameling.

B. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, Commercial Quality.

C. ASTM B 209 - Aluminum Alloy Sheet and Plate.

D. ASTM B 221 - Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

E. ASTM C 208-72 - Specification for Cellulosic Fiber Insulating Board.

F. ASTM C 540 - Method of Test for Image Gloss of Porcelain Enamel Surfaces.

G. ASTM C 614 - Standard Test Method for Alkali Resistance of Porcelain Enamels.

H. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

I. ANSI A208.1-79 for particleboard.

J. ANSI H35.1-82 for aluminum temper and alloy.

K. ANSI IES-RP-3 for school lighting.

L. HNSI A424-80 for steel for porcelain enameling

M. FS LLL-B-810 for tempered hardboard

N. PEI-104 minimums for porcelain enameling

O. BYK-Gardner Surface Distortion coating.

P. Porcelain Enamel Institute

1.04 SUBMITTALS

A. Samples/Product Data

1. Submit in accordance with Section 01 33 00.
2. Product data
3. Product use and maintenance instructions
4. Drawings shall indicate location and actual material lengths of each unit. Room elevations shall indicate joint locations and include dimension from floor and adjacent sidewalls, cross sections for trim, backing, face and core materials, fastener spacing and types of units provided.

1.05 DELIVERY, STORAGE AND HANDLING

A. All stored material shall be protected from the elements in accordance with Section 01 60 00 and manufacturer's requirements.

B. Do not deliver materials to site until areas in which they are to be installed are ready to receive them.

C. Deliver materials to site in protective covering in a manner to protect their finishes.

D. Store materials in dry areas and above temperatures above 55° F.

E. Contractor to maintain proper environment prior to, during and after installation.

F. Adhesives are to be used with adequate ventilation.

1.06 WARRANTY

A. Provide written warranty from manufacturer in accordance with Section 01 77 00.

B. Provide for replacement of markerboard of all boards which do not retain their original writing and erasing qualities for life of the facility.

1.07 MAINTENANCE

A. Submit manufacturer's data on recommended cleaning and stain removal procedures in accordance with Section 01 78 23.

1.08 PROJECT/SITE CONDITIONS

A. Prior to installation, the installer shall inspect all surfaces to receive boards so as to confirm a suitable plumb substrate for the installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Polyvision 100 Series

B. Other Acceptable Manufacturers

1. Carolina Chalkboard
2. Claridge Products and Equipment, Inc.
3. Egan Visual
4. Peter Peper

2.02 MATERIALS

A. The porcelain writing surface shall be 7 mil thick and be fused to 28 gauge steel at 1500 degrees F.

B. Markerboard shall be composed of a lightweight recycled honeycomb core with a 28 gauge steel adhered to each side. The corners shall have a 1-1/4 inch radius. The sandwich construction shall then be framed in 16 gauge aluminum that has been etched and anodized. Provide a 16 inch L x 1-5/8 inch D plastic marker tray using a design that neatly allows it to slide over the aluminum frame maintaining flexibility of positioning.

C. Core: 1/2 inch thick particleboard shall be provided. (Units 16'-0" width and greater will require spline type joint.)

D. Moisture backer shall be factory laminated to core material. Aluminum backer shall be provided standard on all units with routed steel spline joints.

E. Attachment Devices: Concealed hanger clips at top and bottom as required.

F. Lamination

1. Factory machine type only.
2. Specialty formulated adhesives.

G. Markerboard Color: White

H. Provide 4 markers and 1 eraser per markerboard.

2.03 MATERIALS FOR TACKABLE SURFACES

A. Core Materials: 1/2 inch nominal thickness industrial fiberboard

B. Vinyl Covering: 15 oz. Per L.Y. - Nacoweave I, Nacoweave IA.

C. Fabric Covering: As listed in drawings

D. Lamination

1. Factory machine type.
2. Specially formulated adhesives.

E. Attachment Devices: Concealed hanger clips at top and bottom as required.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide factory-trained installers.

B. Apply manufacturers' adhesive behind each board using egg-sized gobs 16 inches on center.

C. Provide covering for H-moldings to match vinyl-covered boards.

D. Clean boards using manufacturers' recommended procedures and install cleaning labels for each room.

E. Locate accessories on each board as specified.

F. Provide fasteners at perimeter trims 16 inches - 24 inches and 12 inches - 16 inches on trays.

3.02 CLEANING

A. At completion of work, clean surfaces and trim in accordance with manufacturer's recommendations. Break in chalkboards and markerboards as recommended by manufacturer leaving ready for use.

3.03 PROTECTION

A. Cover and protect all boards after installation and cleaning.

3.04 CLOSEOUT DOCUMENTS

A. Provide all maintenance and warranty, cleaning and use documents.

END OF SECTION 10 11 00