FRANKLIN COUNTY TECHNICAL SCHOOL AUTHORITY RENOVATIONS TO THE FRANKLIN COUNTY CTC

VOLUME 2 – DIVISIONS 2-12 TECHNICAL SPECIFICATIONS

CRA PROJECT NO. 2776

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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Sections include the following:

1. Division 1 Section "Summary of Work" for use of premises, and phasing, and Owner-occupancy requirements.
2. Division 1 Section "Temporary Facilities & Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities and environmental-protection measures for selective demolition operations.
3. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
4. Divisions 15 and 16 for demolishing, cutting, patching, or relocating mechanical and electrical items.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to the Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.

1. Before demolition and throughout construction, all Prime Contractors shall be responsible to review with the Owner's, all items being removed by their trades. All items designated during this review to remain the Owner's property, shall be maintained in good condition and turned over to the Owner.

1.5 SUBMITTALS

A. Qualification Data: For Contractor.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of proposed dust and noise-control temporary partitions and means of egress.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
6. Means of protection for items to remain and items in path of waste removal from the building.
7. Use of elevators and stairs.

Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

C. Pre-demolition Photographs or Recordings: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

D. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that specializes in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

A. The Owner will occupy portions of the building immediately adjacent to the selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

1. Comply with requirements specified in Division 1 Section "Summary of Work."

B. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as is practical.

1. Before selective demolition, the Owner will remove the following items:

a. List of items.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Architect and Owner. The Owner will remove the hazardous materials under a separate contract, or request a proposal to remove the hazardous materials.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

F. All Contractors shall be responsible for verification of all existing building dimensions and conditions, including finishes and materials, systems shown and designated as existing on the Contract Drawings prior to starting demolition and construction. Any discrepancies in information indicated on the Contract drawings shall be directed in writing to the attention of the Architect prior to the start of demolition and construction. Verification of clearances required for all new equipment, piping, ductwork and related components shall be the Contractor's responsibility.

G. All Contractors shall patch, repair or replace all existing finishes and materials disturbed or damaged during demolition. All repair or replacement shall match adjacent existing and/or new finishes and materials as indicated.

H. See Architectural, Structural, Mechanical, Electrical and Plumbing drawings for demolition work required. Coordinate all Work by other Contractors, including, but not limited to, capping and disconnection of building services.

I. Existing conditions as appear in these Contract Documents may vary with actual conditions because of undocumented work performed by Owner's staff and by other contractors.

J. All Contractors shall be responsible for verification of all demolition conditions related to accepted Alternate bids, including finishes and materials, systems shown and designated as existing or new on the Contract Drawings prior to starting of demolition and construction. Any discrepancies in information indicated on the Contract Drawings shall be directed in writing to the attention of Architect prior to starting demolition and construction.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine the extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.

E. Engage a professional engineer to survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, or preconstruction videotapes.

1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproductions.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary of Work."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. The Owner will arrange to shut off indicated services/systems when requested by the Contractor. The Contractor may make these arrangements if approved by the Owner.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition, provide temporary services/systems that bypass the area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

a. Where an entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities & Controls"

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective `demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities & Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated in the Contract Documents without Architect's approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Cut concrete at junctures with construction to remain, using power-driven saw. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

E. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 7 Sections for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories as indicated in the demolition and renovation notes.

F. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

G. Refer to the drawings for additional demolition work if any for each room or building component.

H. Prepare existing remaining substrates to receive new finishes as indicated on the finish schedule. Preparation of substrates shall be in conformance with the installation requirements of each new finish.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 042000 - UNIT MASONRY (ASSEMBLIES)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Face brick.
4. Mortar and grout.
5. Reinforcing steel.
6. Masonry joint reinforcement.
7. Ties and anchors.
8. Embedded flashing.
9. Miscellaneous masonry accessories.

B. Related Sections include the following:

1. Division 3 Section “Cast-In-Place Concrete”
2. Division 5 Section “Metal Fabrications”
3. Division 5 Section “Structural Steel Framing”
4. Division 5 Section “Cold Formed Metal Framing”
5. Division 7 Section “Elastomeric Sheet Waterproofing”
6. Division 7 Section "Sheet Metal Flashing and Trim"
7. Division 7 Section "Fire-Resistive Joint Systems"
8. Division 7 Section “Joint Sealants”
9. Division 8 Section “Hollow Metal Doors and Frames”

1.3 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following net-area compressive strengths (f'm) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1. For Concrete Unit Masonry: f'm = 1500 psi.

1.5 SUBMITTALS

A. Product Data: For each different masonry unit, accessory, and other manufactured product specified, to comply with requirements in Division 1 Section "Submittals".

B. Masonry Pre-installation Shop Drawings:

1. Preliminary Shop Drawings to be reviewed by all Prime Contractors at Pre-Installation Conference.
2. Shop Drawings to incorporate Structural changes, piped sleeves and wall openings as necessitated by interference issues of all relative equipment, material and penetrations associated with the Work shown in Coordination Drawings, described in Division 1 Section "Project Management and Coordination."
3. Submit prior to installation of unit masonry.
4. Submit minimum 1/8"=1'0" drawing elevations of all masonry walls showing the following:

    a. Areas of different types of Concrete Masonry Units and Brick based on size, color, texture and special shapes.
    b. Sizes and locations of all masonry openings including related lintels.
    c. Horizontal masonry bond beams.
    d. Control and Expansion joints.
    e. Locations of any concealed *in-wall* rainwater conductors and outlets.
    f. Vertical and horizontal reinforcement configurations and spacing. Steel reinforcing to comply with Division 3 Section "Cast-in-Place Concrete".
    g. Locations and detailed method of attachment to all supporting Structural items and systems.

5. Submit Fabricated Flashing type details, sections and installation methods; including, but not limited to, *through-wall* base flashing, sill flashing, head flashing, low roof/high wall flashing, cap flashing, corner flashing, end dam flashing, stepped flashing and 2-piece flashing assembly.
6. Submit details and installation methods incorporating special shape units.
7. Submit documentation of constructability issues as related to design, installation methods, applicable building code, fire-rating and/or compatibility conditions. Accompany documentation with most recent Technical Standards published by International Masonry Institute, National Concrete Masonry Association, Brick Industry Association and the product manufacturer's printed recommendations.

C. Samples for Initial Selection of the following:

1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required. Submit face brick to show range of colors, texture and mortar types for matching existing brick. Submit concrete masonry samples to illustrate texture.
2. Colored mortar samples showing the full range of colors available.

D. Samples for Verification: For the following:

1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.

2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
3. Weeps/vents in color to match mortar color.
4. Accessories embedded in the masonry.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

G. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Each type of masonry unit required.

   a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
   b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units and gross-area compressive strength of clay bricks.

2. Mortar complying with ASTM C 270.
3. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.
4. Submit concrete mix design for filling masonry cells and bond beams. Use concrete mix having a 28-day compressive strength of 3000 psi.

H. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.

   a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
   b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.

2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
4. Each material and grade indicated for reinforcing bars.

5. Each type and size of joint reinforcement.
6. Each type and size of anchor, tie, and metal accessory.

I. Hot and Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot and cold-weather requirements.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, through one source from a single manufacturer and manufacturing plant.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

D. Testing Service: Owner to engage a qualified independent testing agency to perform tests in compliance with applicable codes.

E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per Applicable Code by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

F. Sample Panels: Prior to installation of above grade unit masonry, build sample panels, using single wythe veneer materials selected for the completed Work. Build sample panels for each type of veneer masonry in sizes approximately 48 inches long by 48 inches high by full unit thickness.

1. Locate panels in the locations indicated or, if not indicated, as directed by Architect.
2. Clean exposed faces of panels with masonry cleaner indicated.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by Architect in writing.
    b. Demolish and remove sample panels when directed.

G. Mockup Panels: Prior to installation of above grade unit masonry, allowing sufficient time for construction and approval, build mockup panels, using materials and products

indicated for the completed Work, to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build mockup panels for each type of unit masonry assembly in sizes of full assembly thickness by approximately 72 inches long by 72 inches high or larger to accommodate all necessary components.

1. Notify Architect seven days in advance of dates and times when mockups will be constructed.
2. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
3. Provide masonry opening with installed aluminum window frame, steel lintel, sill and associated blocking and flashing as detailed in the drawings and as specified in this Section.
4. Include metal coping, roof edge fascia, gutters, *thru-wall* overflow roof scupper and associated blocking and fasteners as detailed in the drawings and as specified in Division 7 Section "Sheet Metal Flashing and Trim".
5. Omit portions of veneer, sill, coping, fascia and aluminum frame in order to provide viewable *"cut-away"* areas and items of construction ordinarily hidden behind finished wall construction. Coordinate with Architect prior to Mockup Panel construction.
6. Build mockups for the following types of unit masonry assemblies in sizes required by full assembly thickness, including face veneer, cavity, backup and accessories. Include a sealant-filled vertical joint at least 16 inches long in each mockup.

    a. Exposed unit masonry veneer with unit masonry backup assembly.
    b. Exposed unit masonry veneer with metal stud backup assembly.
    c. Other assemblies incorporating unit masonry backup and claddings as specified in related sections including but not limited to, metal panel systems and exterior insulation finish system.
    d. Sealants as specified in Division 7 Section "Joint Sealants".

7. Clean exposed faces of mockups with masonry cleaner as indicated.
8. Protect accepted mockups from the elements with weather-resistant membrane.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Approval of mockup panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; incorporation of specified and detailed products and accessories and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.

11. Demolish and remove mockups only when directed by Architect.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

1. Protect concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 50 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning. Follow manufacturer's recommendations for minimum temperature.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Provide bullnose units for ALL INTERIOR outside corners.
3. Provide single score units where indicated.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi for f'm=1500 psi.
2. Weight Classification: Normal weight.
3. Size (Width): Manufactured to the following dimensions:

a. 4 inches nominal; 3-5/8 inches actual.
b. 6 inches nominal; 5-5/8 inches actual.
c. 8 inches nominal; 7-5/8 inches actual.
d. 10 inches nominal; 9-5/8 inches actual.
e. 12 inches nominal; 11-5/8 inches actual.
f. 14 inches nominal; 13-5/8 inches actual.
g. 16 inches nominal; 15-5/8 inches actual.

4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

5. Manufacturers:

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Trenwyth Industries, Inc.
2) Nitterhouse Concrete Products, Inc.
3) Fizzano Bros. Concrete Products, Inc.

4) United Glazed Products
5) York Building Products, Inc.
6) Anchor Concrete Products, Inc.
7) New Holland Concrete
8) Beavertown Block Co., Inc.

2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

D. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

1. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C 404.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.

G. Water: Potable.

H. Available Products: Subject to compliance with requirements and suitability as reviewed by the Engineer, products that may be incorporated into the Work include, but are not limited to, the following:

1. Colored Portland Cement-Lime Mix:

a. Eaglebond; Blue Circle Cement.
b. Color Mortar Blend; Glen-Gery Corporation.
c. Rainbow Mortamix Custom Color Cement/Lime; Holnam, Inc.
d. Centurion Colorbond PL; Lafarge Corporation.
e. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.
f. Riverton Portland Cement Lime Custom Color; Riverton Corporation (The).

2. Mortar Pigments:

a. True Tone Mortar Colors; Davis Colors.
b. Centurion Pigments; Lafarge Corporation.

c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.

2.3 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615; Grade 60.

2.4 MASONRY JOINT REINFORCEMENT

A. General: ASTM A 951 and as follows:

1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter unless otherwise noted.
3. Wire Size for Cross Rods: W1.7 or 0.148 diameter unless otherwise noted.
4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.

B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c. Truss type shall not be used in vertically reinforced unit masonry walls.

2.5 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, and as required by Building Code Requirements for Masonry Structures; use of hot-dipped galvanized ties and anchors in exterior wall construction.

B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.

C. Galvanized Steel Sheet: ASTM A 653, G60, commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.

D. Steel Sheet, Galvanized after Fabrication: ASTM A 366 cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.

E. Steel Plates, Shapes, and Bars: ASTM A 36. Plates, shapes, and bars exposed to weather shall be hot-dipped galvanized after fabrication.

2.6 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME OR LINTELS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire anchor section for welding to steel.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch diameter, hot-dip galvanized steel wire.

2.7 ANCHORS FOR CONNECTING TO CONCRETE

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. DW-10® series veneer anchors by Hohmann & Barnard, Inc., or equal product.

2.8 JOINT STABILIZATION ANCHORS

A. General: Provide stabilization anchors in horizontal joints of masonry units across the joint between walls at T-shape wall intersections as follows:

1. Use either a manufactured steel joint stabilizing anchor consisting of two steel rods, connected together on each side of masonry joint by sliding plate assemblies or 1-1/2" x ¼" x 32" steel strap anchor with 3" (90 degree) right-angle bent ends at masonry shear walls.
2. Anchors to be embedded in grout-filled cores of hollow concrete masonry units.
3. 16" o.c. vertical spacing.
4. Finish: Mill galvanized or hot-dip galvanized to comply with ASTM A 153.

2.9 ADJUSTABLE MASONRY-VENEER ANCHORS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment through rigid insulation to wood or metal studs, and as follows:

1. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:

1. Anchor Section: Gasketed sheet metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs to penetrate insulation/sheathing and contact studs; and raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.

    a. Plate 1-1/4 inches wide by 6 inches long with strap 5/8 inch wide by 6 inches long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more than 1/32 inch.
    b. Provide anchor manufacturer's standard, self-adhering, gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.

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

1. Screw-Attached, Masonry-Veneer Anchors:

    a. X-SEAL with box tie with drip and X-SEAL Tape; Hohmann & Barnard, Inc.

2.10 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.

B. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:

1. Headed bolts.
2. Nonheaded bolts, bent in manner indicated.

C. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Type: Chemical anchors.
2. Type: Expansion anchors.
3. Type: Undercut anchors.
4. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
5. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

2.11 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Follow brick manufacturer's recommendations for cleaning solution for each brick type.

1. Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:

a. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching:

1) 202 New Masonry Detergent; Diedrich Technologies, Inc.
2) Sure Klean No. 600 Detergent; ProSoCo, Inc.

b. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining:

1) 200 Lime Solv; Diedrich Technologies, Inc.
2) Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.

c. Cleaners for Brick Subject to Metallic Staining:

1) 202V Vana-Stop; Diedrich Technologies, Inc.

2) Sure Klean Vana Trol; ProSoCo, Inc.

2.12 MORTAR AND GROUT MIXES

A. General: Do not use calcium chloride. The use of admixtures shall not be considered unless their suitability is reviewed by the Engineer and demonstrated by laboratory test results simulating the conditions that warrant the desired use of the admixture.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.

1. Limit cementitious materials in mortar to portland cement and hydrated lime.
2. For masonry below grade, in contact with earth, and where indicated, use Type M mortar one (1) part portland cement, (1/4) part Type S hydrated lime and (3-3/4) parts sand, with minimum 28-day compressive strength of 2500 psi.
3. For above grade walls use Type N mortar (1) part portland cement, (1) part hydrated lime Type S and (6) parts sand.

D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Limit pigments to the following percentages of cement content by weight:

1. For mineral-oxide pigments and portland cement-lime mortar, not more than 10 percent.
2. For carbon-black pigment and portland cement-lime mortar, not more than 2 percent.
3. For mineral-oxide pigments and mortar cement mortar, not more than 5 percent.
4. For carbon-black pigment and mortar cement mortar, not more than 1 percent.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates combined with selected cementitious materials.

1. Mix to match Architect's sample.

F. Grout for Unit Masonry:

1. Use either pea gravel cement concrete or grout confirming to ASTM C476 with a minimum 28-day compressive strength of 3000 psi.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

2.13 SOURCE QUALITY CONTROL

A. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, meet the requirements in the "Concrete Masonry Units" Paragraph of this Section. Units will be tested according to ASTM C 140.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

A. Unit Masonry Assemblies shall be installed in accordance with Contract Documents, most recent technical standards published by International Masonry Institute, National Concrete Masonry Association, Brick Industry Association and the product manufacturer's printed recommendations.

B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.

C. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.

D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.

D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
   1. Match existing bond pattern.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

G. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

H. Entire courses and/or individual units of irregular surface faced masonry (i.e., split face) shall be turned smooth side out in locations as directed by Architect during Preinstallation Conference.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Fire-Resistive Joint Systems".

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and compress into place. Do not deeply furrow bed joints or slush head joints.

1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.

C. Set stone trim units in full bed of mortar with vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone-joint surface thoroughly before setting; for soiled stone surfaces, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

D. Site wall copings or caps (including stone, concrete and masonry) to be set on EPDM flashing. Extend flashing full wall thickness, a minimum of 1-inch beyond the exterior faces of the masonry. Seal laps between lengths of flashing with lap sealant, overlap 2" to 3". Provide water-tight seal around anchors using flashing manufacturer's recommended products. Trim off flashing uniformly ¼" beyond the face of veneer when joint is fully cured, but not before directed by Architect (creating ¼" drip edge). Tool exposed joints to a point 3/8" below face of coping or cap material. Apply continuous sealant bead in tooled joints. Sealant to match site wall mortar color.

E. Sill units (including stone, concrete and masonry): Tool exposed joints to a point 3/8" below face of material. Apply continuous sealant bead in tooled joints. Sealant to match mortar color.

F. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

G. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with grout at exterior walls, except cavity walls, and solidly with mortar at interior walls and partitions.

3.6 CAVITIES

A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints of back-up wall wythes facing cavities flush.

B. Installing Cavity-Wall Insulation: Apply rectangular grid adhesive on inside face of insulation boards. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Seal or tape all insulation board joints, crack and gaps, piping and conduit penetrations with materials compatible with insulation and masonry.

3.7 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.

a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

D. At all flashing locations, reinforcement shall not interrupt the flashing.

3.8 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Anchor masonry to structural members with flexible channel slot anchors embedded in masonry joints and attached to the structure. Provide a 1-inch space in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Space anchors at the location of the slotted channel anchor assembly on the structure member.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through

movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces. Maximum distance between C.M.U. control joints shall not exceed distances as indicated on Structural Drawings.
2. Install preformed control-joint gaskets designed to fit sash block.

C. Form building expansion joints in exterior masonry veneer as follows:

1. Form open joint of width indicated; install compressible exterior expansion joint filler as per manufacturers' recommendation. Keep joint free and clear of mortar. Locations as indicated on drawings.

D. Build in pressure-relieving expansion joints where indicated; construct joints by installing compressible expansion material.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make the formwork sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.11 FIELD QUALITY CONTROL

A. Contractor shall engage a qualified independent testing agency to perform field quality-control testing indicated below.

B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 35,000 bricks or 5,700 concrete masonry units Testing requirements for mortar and grout may be deleted if prism testing is retained.

C. Mortar properties will be tested per ASTM C 780.

D. Grout will be sampled and tested for compressive strength per ASTM C 1019.

E. Prism-Test Method: For each type of structural masonry wall construction indicated, masonry prisms will be tested per ASTM C 1314, and as follows:

1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.

F. Test weeps. Allow masonry 12 hours setting time before test. Test to be done in 10' lengths of cavity.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

3.13 MASONRY WASTE DISPOSAL

A. Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood furring and grounds.
5. Wood sleepers.
6. Utility shelving.
7. Plywood backing panels.

B. Related Sections include the following:

1. Division 6 Section "Sheathing."

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. RIS: Redwood Inspection Service.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

B. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria":

1. Dimension lumber framing.
2. Miscellaneous lumber.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish omit marking and provide certificates of treatment compliance issued by inspection agency.

C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

D. Application: Treat items indicated on Drawings, and the following:

1. Concealed blocking.
2. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent for **2-inch nominal** thickness or less, 19 percent for more than **2-inch nominal** thickness or less, no limit for more than 2-inch nominal thickness.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.

C. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content and the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB, or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

D. For exposed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
2. Mixed southern pine, No. 2 grade; SPIB.
3. Hem-fir or hem-fir (north), Select Merchantable or No. 1 Common grade; NLGA, WCLIB, or WWPA.
4. Spruce-pine-fir (south) or spruce-pine-fir, Select Merchantable or No. 1 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

E. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods, No. 2 Common grade; NeLMA.
5. Northern species, No. 2 Common grade; NLGA.
6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

F. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

G. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

H. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

C. Basis-of-Design Products: Subject to compliance with requirements, provide comparable products by one of the following:

1. Alpine Engineered Products, Inc.
2. Cleveland Steel Specialty Co.
3. Harlen Metal Products, Inc.
4. KC Metals Products, Inc.
5. Simpson Strong-Tie Co., Inc.
6. Southeastern Metals Manufacturing Co., Inc.
7. USP Structural Connectors.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

E. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations where stainless steel is not indicated.

F. Stainless-Steel Sheet: ASTM A 666, Type 304.

1. Use for exterior locations and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.

H. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

I. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at **16 inches** o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at **16 inches** o.c.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 074120 - METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Factory-formed and field-assembled, exposed-fastener corrugated wall panel system and lap-seam metal wall/soffit panels system.

B. Related Sections include the following:

1. Division 7 Section "Sheet Metal Flashing and Trim" for fasciae, flashings and other sheet metal work not part of metal wall panel assemblies.
2. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.3 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, and accessories necessary for a complete weathertight system.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft.

C. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

D. Water Absorption: Maximum 1.0 percent absorption rate by volume when tested according to ASTM C 209.

E. Thermal Movements: Provide metal wall panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

A. Product Data: Include manufacturer's specifications, construction details, material descriptions, standard profile sheet, product data brochure, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

a. Flashing and trim.

C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.
2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:

1. Metal Wall Panels: Include reports for air infiltration and water penetration.

F. Maintenance Data: For metal wall panels to include in maintenance manuals.

G. Warranties: Warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Engineering Responsibility: Preparation of data for metal wall panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Source Limitations: Obtain each type of metal wall panel through one source from a single manufacturer.

1. Panel manufacturer shall have a minimum of ten (10) years experience in manufacturing exposed fastener roofing and siding panels.

2. Panel installer shall have a minimum of two (2) years experience in the installation of exposed fastener roofing and siding and show evidence of successful completion of projects similar in size, scope and complexity.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal wall panels and are based on the specific system indicated.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, and installers whose work interfaces with or affects metal wall panels including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
6. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
7. Review temporary protection requirements for metal wall panel assembly during and after installation.
8. Review wall panel observation and repair procedures after metal wall panel installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal wall panels from exposure to sunlight and high humidity, except to extent necessary for period of metal wall panel installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal wall panels without field measurements, or allow for field trimming of panels. Coordinate wall construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

B. Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter Units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal wall panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Weathertight Warranty Period: 10 years from date of Substantial Completion. (Weathertight Warranty only applies to smooth metal panel).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 PANEL MATERIALS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653 G90 coating designation; structural quality.
2. Surface: Smooth, flat finish.
3. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.

a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight. Color shall match the EXISTING metal wall panels.

b. Color Matching: The color of the metal wall panels, access door, accessories, metal flashing and trim shall be the EXACT same color and shall match the EXISTING metal wall panels.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Self Tapping ZAC IMPAX SELF DRILL & ZAC STITCH SCREWS, as manufactured by Direct Metals Inc., designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.

1. Fasteners for wall panels: Exposed fasteners shall be non-corrosive and as recommended by the panel manufacturer. Fasteners shall be prefinished to match panels.

2.4 LAP-SEAM METAL WALL PANELS AND EXPOSED-FASTENER CORRUGATED WALL PANELS

A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Lap-Seam "Smooth" Metal Wall Panel: Steel panels with one 12" wide raised rib for a total coverage of 12" per panel. The 12" rib shall have a depth of 1 1/2". There shall be two small stiffening beads centered in the rib. The panels shall have an interlocking sidelap feature which hides the fasteners.

1. Basis-of-Design Product: **Fabral "Select Series 12-R2"** panel.
2. Manufacturers:

a. Fabral Metal Wall and Roof Systems
b. MBCI
c. AEP Span
d. Alcoa Corporation.
e. Petersen Aluminum Corporation.

3. Material: Zinc-coated (galvanized) steel sheet, 24-gage.

4. Finish Color:
   1) PANEL TYPE – SMOOTH METAL PANEL

Panel Color – **Fabral "Regal Blue" - Match Existing**

C. Corrugated Metal Wall Panels: Steel panels with a coverage of 36". Rib heights shall be 1 ½". Panels shall be directly fastened to the substrate. The panels shall have a overlapping sidelap feature.

1. Basis-of-Design Product: **Fabral "Hefti-Rib"** Exposed-Fastener panel.
2. Manufacturers:

   a. Fabral Metal Wall and Roof Systems
   b. MBCI
   c. AEP Span
   d. Alcoa Corporation.
   e. Petersen Aluminum Corporation.

3. Material: Zinc-coated (galvanized) steel sheet, 24-gage.

4. Finish Color:
   2) PANEL TYPE – CORRUGATED METAL PANEL

Panel Color – **Fabral "Regal Blue" – Match Existing**

D. Metal Panel Color: All metal panel, trim and accessories colors shall match one another per the factory finish.

2.5 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, preformed mitered corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

B. Flashing and Trim: All flashing and trim shall be the same material, gauge, finish and color as the wall panels and fabricated in accordance with standard SMACNA procedure and details. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, and miscellaneous flashing. Finish flashing and trim with same finish system as adjacent metal wall panels.

C. Provide color-matched touch-up paint to owner once substantially complete.

2.6 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as

necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
2. Fabricate wall panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Install weeps at the sill of the metal wall panel sill at the spacing and size per the manufacture recommendations. All sills shall slope way from building to allow for proper drainage.

D. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

E. Panel lengths shall be as long as practicable to minimum horizontal joints.

F. Sheet Metal Accessories: Fabricate flashing and trim to comply with manufacturers recommendations that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2.7 FINISHES, GENERAL

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.

1. Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

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

3.2 PREPARATION

A. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

3.3 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
2. Install screw fasteners in predrilled holes.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Install flashing and trim as metal wall panel work proceeds.

B. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

1. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

3.4 FIELD-ASSEMBLED METAL WALL PANEL INSTALLATION

A. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weatherproof to driving rains.
7. At panel splices, nest panels with minimum end lap, recommended by manufacturer, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
8. At Corrugated Panel to Corrugated Panel corner connections, Panels are to be mitered and welded.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet , nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07412

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes sheet metal flashing and trim in the following categories:

1. Exposed Trim and Fascia
2. Metal Flashing
3. Copings
4. Roof Edge Fascia
5. Scuppers

B. Related Sections:

1. Division 4 Section "Unit Masonry Assemblies" for through-wall flashing and other integral masonry flashings specified as part of masonry work.
2. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
3. Division 7 Section “Composite Wall Panels” for installing sheet metal flashing and trim integral with composite wall panels.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Fabricate and install flashings capable of resisting design forces according to recommendations in FMG Loss Prevention Data Sheet 1-49. Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting design forces.

1. Refer to Structural Drawings for wind design criteria.

C. FM Approvals' Listing: Manufacture and install copings and roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

D. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes. For copings and roof

edge flashings, allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 3 inches per 1 foot.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing, Trim, Copings, Roof Edge Flashings, Metal Closures, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
2. Accessories and Miscellaneous Materials: Full-size Sample.
3. Aluminum Samples: Samples to show full range of available colors.

D. Qualification Data: For qualified fabricator.

E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation. Construct mockups as a part of the mockups specified in Division 4 Section "Unit Masonry Assemblies"

1. Build mockups of typical roof conditions, including coping assembly, fascia, fascia trim, and/or apron flashing, including supporting construction cleats, seams, fasteners, attachments and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

D. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Surface: Smooth, flat.
2. Exposed Coil-Coated Finishes:

a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Color: As selected by Architect from manufacturer's full range.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

H. Do not use graphite pencils to mark metal surfaces.

2.4 COPINGS

A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. ATAS International, Inc.
    b. Cheney Flashing Company.
    c. Hickman Company, W. P.
    d. Johns Manville.
    e. Metal-Era, Inc.
    f. MM Systems Corporation.
    g. Petersen Aluminum Corporation.

2. Corners: Factory mitered and soldered.
3. Coping-Cap Attachment Method: Face leg hooked to continuous cleat.

2.5 ROOF-EDGE FLASHINGS

A. Canted Roof-Edge, Fascia and Gravel Stop: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet cant, 0.034 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. ATAS International, Inc.
    b. Cheney Flashing Company.
    c. Hickman Company, W. P.
    d. Johns Manville.
    e. Metal-Era, Inc.
    f. MM Systems Corporation.
    g. Petersen Aluminum Corporation.

2. Corners: Factory mitered and soldered.
3. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

B. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Hickman Company, W. P.
    b. Johns Manville.
    c. Metal-Era, Inc.
    d. National Sheet Metal Systems, Inc.

2. Corners: Factory mitered and soldered.
3. Splice Plates: Concealed of same material, finish, and shape as fascia cover.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:

1. Stainless Steel: 18 gauge.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. Examine walls, roof edges, and parapets for suitable conditions.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

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

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof specialty and sheet metal flashing and trim systems.

1. Install roof specialties and sheet metal flashing and trim level, plumb and true to line and elevation with limited oil-canning. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or pressure treated wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of a corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and solder or seal with elastomeric sealant to scupper.
2. Flash and seal scupper into adjacent roof to form a complete, watertight installation.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes:

1. Exterior sealants.
2. Exterior EIFS sealants.
3. Exterior and interior traffic sealants.
4. Interior sealants.
5. Interior food contact sealants.
6. Interior sanitary sealants.
7. Exterior and interior water immersed sealants.
8. Metal lap joint sealants.
9. Threshold and sheet metal bedding sealants.
10. Joint accessories.
11. Security sealants.

B. Related Sections include the following:

1. Division 4 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Division 7 Section "Through Penetration Firestop System" for building joint-sealant systems.
3. Division 8 Section "Glazing" for glazing sealants.
4. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
5. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 SUBMITTALS

A. Shop Drawing:

1. Submit a Sealant Schedule, and related details, indicating specific installation and interface between sealants and building materials for each type of joint sealant and joint backing material used in this specification. Use SAME reference designations as indicated in this Specification for preparation of the Joint Sealant Schedule in Part 3.6. Submittals are subject to the requirements of Division 1 Specification Section "Submittals."

B. Product Data:

1. For each joint-sealant product indicated.

C. Samples:

1. Submit standard cured color samples and charts for each sealant type illustrating full range of standard and custom colors.

D. Manufacturer's Certificate:

1. Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
2. For manufacturer's products that include the phrase, "but are not limited to the following," the Contractor shall be responsible to provide certification that the submittal product complies with the specified product. This certification is subject to the requirements of Division 1 Specification Section "Submittals," Part 1, Definitions.

E. Qualifications Data:

1. For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified. Provide SWRI (Sealant, Waterproofing and Restoration Institute) Validation Certificate.

F. Compatibility and Adhesion from sealant manufacturer indicating the following:

1. Building materials forming joint and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
3. Preconstruction Compatibility and Adhesion Field Test for each sealant and building material.

G. LEED Project Submittals:

1. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Submit recommended inspection intervals.
2. Submit instructions for repairing and replacing failed sealed joints.

1.5 QUALITY ASSURANCE

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Provide SWRI (Sealant, Waterproofing and Restoration Institute) Validation Certificate.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
3. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience for the following sealant types:

1. Multi-component sealants cure by chemical reaction. Cure times are predictable depending on atmospheric temperature. Silicone sealant cure is not affected by temperature, however, frost and moisture at bond line will impair adhesion.
2. Single component sealants cure by reaction with moisture. Cure times will vary depending on atmospheric humidity and temperature.
3. Fast cure (FC) sealants provide lesser cure times than corresponding standard cure products. Longer cure times will permit more accumulation of dust and other air-borne contamination on surface of sealant, potentially causing apparent color change.
4. Sealant Types are M – Multi-Component and S – Single Component.
5. Sealant Grades are P – Pourable or Self-Leveling used for horizontal traffic joints and NS – Non-Sag or Gunnable used for vertical and non-traffic joints.
6. Sealant Classes are 25, 50, and 100/50 (extension/compression) representing movement capability in percent of joint width. Joint movement is based on the relative percentage of installed width. Design to a minimum of 4 times anticipated movement to accommodate design tolerances and expected movement based on coefficient of thermal expansion.
7. Sealant Uses are T – Traffic, NT – Non-Traffic, I – Immersion, M – Mortar, A – Aluminum, and O – Other. Use O includes color anodized aluminum, metals other than aluminum, painted surfaces, brick, stone, tile, and wood for example.
8. Immersion rated sealant applications require primer.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food; provide products that comply with 21 CFR 177.2600.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range of standard and custom colors.

2.2 URETHANE SEALANT TYPES – For exterior or interior use.

A. **U1** - Multi-Component, Non-Sag, Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Pecora Corporation; Dynatrol II.
2. Polymeric Systems, Inc.; PSI-270.
3. Tremco, Inc.; Dymeric 240 FC.

B. **U2** - Multi-Component, Traffic-Grade Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses T, Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Polymeric Systems, Inc.; PSI-270
2. Tremco, Inc.; Dymeric 240 FC.

C. **U3** - Single-Component, Non-Sag Urethane: ASTM C920, Type S, Grade NS, Class 100/50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Sika Corporation, Construction Products Division; Sikaflex-15LM.
2. Tremco, Inc.; Dymonic FC

D. **U4** - Single-Component, Non-Sag Urethane: ASTM C920, Type S, Grade NS, Class 25, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Pecora Corporation; Dynatrol I-XL.
2. Sika Corporation, Construction Products Division; Sikaflex-1a.
3. Tremco, Inc.; Dymonic or Fulkem 116.

E. **U5** - Single-Component, Pourable, Traffic-Grade Urethane: ASTM C920, Type S, Grade P, Class 25, Uses T. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Pecora Corporation; Urexpan NR-201.
2. Tremco, Inc; Vulkem 45SSL.
3. Sika Corporation, Construction Products Division; Sikaflex-1CSL.

F. **U6** - Immersible, Single Component, Pourable, Traffic-Grade Urethane: ASTM C 920, Type S, Grade P, Class 25, Uses T and I. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Sika Corporation, Construction Products Division; Sikaflex-1CSL.
2. Tremco, Inc.; Vulkem 45 SSL.

G. **U7** - Immersible, Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C920. Type M, Grade P, Class 25, for Use T and I. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. LymTal International, Inc.; Iso-Flex 880GB.
2. May National Associates, Inc.; Bondaflex PUR 2 SL.
3. Tremco, Inc.; Vulkem 245

2.3 SILICONE SEALANT TYPES – For exterior or interior use.

A. **S1** - Single-Component, Non-Staining, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to the following:

1. Dow Corning Corporation; 756SMS, 791, 795 or 995.
2. Tremco, Inc.; Spectrem 3.
3. Pecora Corporation; 864, 895 or 898.

B. **S2** - Single Component, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 100/50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Dow Corning Corporation; 790
2. Pecora Corporation; 301NS, 311NS.
3. Tremco, Inc.; Spectrem 1.

C. **S3** - Single Component, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Dow Corning Corporation; 791, 795 or 995.
2. Pecora Corporation; 864, 895 or 898.
3. Tremco, Inc.; Spectrem 2, Proglaze SSG.

D. **S-4** - Single Component, Field-Tintable, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with

requirements, products that may be incorporated into the Work include, but are not limited to the following:

a. Pecora Corporation; 890 FTS.
b. Tremco, Inc.; Spectrem 4TS.

E. **S5** - Mildew-resistant, Single Component, Acid-Curing Silicone: ASTM C920, Type S, Grade NS, Class 25, uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. BASF Building Systems; Omniplus
2. Dow Corning Corporation; 786 Mildew Resistant.
3. Tremco, Inc.; Tremsil 200 Sanitary.

2.4 LATEX SEALANT TYPES – For Interior Use Only

A. **L1** – Acrylic Latex or Siliconized Acrylic Latex, ASTM C834, Type OP, Grade NF. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. BASF Building Systems; Sonolac.
2. Pecora Corporation; AC-20+.
3. Tremco, Inc.; Tremflex 834.

B. **L2** - Acoustical Joint Sealant for Exposed and Concealed Joints: ASTM C1311 Manufacturer's standard Non-sag, paintable, no staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Tremco, Inc.; Acoustical Sealant.
2. Pecora Corporation; AC-20 FTR, AIS-919.
3. USG Corporation; SHEETROCK Acoustical Sealant.

2.5 SOLVENT-RELEASE-CURING-JOINT SEALANTS:

A. **B1** - Butyl-Rubber-Based Joint Sealant: ASTM C 1311. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following.

1. Tremco, Inc.; Tremco Butyl Sealant.
2. Bostik, Inc.; Chem-Calk 300.
3. Pecora Corporation; BC-158.

2.6 PREFORMED JOINT SEALANTS – For exterior or interior applications per manufacturer's standards.

A. **PF1** - Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of procured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Dow Corning Corporation; 123 Silicone Seal
2. Pecora Corporation; Sil-Span
3. Tremco, Inc.; Simple Seal.

B. **PF2** - Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu.ft. (160 kg/cu.m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Tremco, Inc.; illbruk illmod 600.
2. EMSEAL Joint Systems, Ltd.; Emseal 25V.
3. School International, Inc.; Sealtite, Sealtite 50N.

2.7 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASATM C 1330, of type indicated below and size and density to control sealant depth and otherwise contribute to producing optimum sealant performance, paired to the sealant type. List the type on the Sealant Schedule.

1. **Type C**: Closed-cell material with a surface skin.
2. **Type O**: Open-cell material.

    a. Bostik, Inc.
    b. Pecora Corporation
    c. Tremco, Inc.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant back materials, free of oil residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

2.9 EXISTING WORK

A. Mechanically remove existing sealant.

B. Clean joint surfaces of residual sealant and other contaminates capable of affecting sealant bond to joint surface.

C. Allow joint surfaces to dry before installing new sealants.

2.10 SECURITY SEALANTS

A. At all Housing Modules and in all areas accessible to inmates, install pick resistant correctional-complex type security sealant material at all locations, including around lighting fixtures, cover plates, supply and return grilles/registers, at all areas where inmates have access to picking at or removal of caulking material. This includes all voids, gaps (including those between component assemblies) and joints larger than "hairline" are to be caulked with security sealant. List on the Sealant Schedule as Type **ESJS.**

1. Underside of precast planks (hollow-core slab units), which are to remain exposed and are 8 feet or less off finished floor, shall have joints between precast planks caulked with prison security joint sealant.

B. Prison security joint sealant shall have precedence over other specified sealant types.

C. Joint filler material.

D. Security Joint Sealant: Epoxy Security Joint Sealant. Tamper and Abuse Resistant

1. 100% reactive, two component material specifically designed as a prison security sealant. Moisture insensitive, high modulus epoxy gel that can be applied on vertical, horizontal and overhead concrete member joints.

E. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include, but are not limited to, the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include, but are not limited to, the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead ¼ inch (6 mm) inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

Sealant types should be selected from the available listed products in Part 2 of this specification section. These sealants shall be indicated on the submittal schedule,

using the same reference designation as indicated in Part 1.3.A. of this specification section.

A. Exterior or Interior Sealant Joints

1. Applications:

a. Control and expansion joints in cast-in-place concrete.
b. Joints between [architectural] [structural] precast concrete units.
c. Control and expansion joints in unit masonry.
d. Control and expansion joints in stone masonry.
e. Butt joints between metal panels.
f. Joints between different materials listed above.
g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
h. Control and expansion joints in soffits and overhead surfaces.

2. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified

B. Interior Food Contact Sealant Joints.

1. Applications:

a. Joints in kitchen counter tops and work surfaces.
b. Joints between food service equipment and surrounding construction.
c. Other interior joints where incidental food contact may occur.

C. Interior Sanitary Sealant Joints.

1. Applications:

a. Joints in toilet room and bathroom counter tops.
b. Joints between plumbing fixtures and adjacent materials.
c. Joints between locker room lockers and adjacent materials.
d. Joints between food service equipment and surrounding construction.
e. Other interior joints in wet areas where needed to limit mold and mildew growth.

D. Immersed Sealant Joints.

1. Applications:

a. Joints in fountains and water features.
b. Joints in swimming pools.
c. Joints in vertical and horizontal surfaces of other potable water storage structures.

E. Metal Lap and Bedding Sealant Joints.

1. Applications:

a. Concealed lap and hook joints in sheet metal flashing and trim.
b. Bedding joints under metal thresholds and saddles.
c. Bedding joints between sheet metal flashing and other materials.

F. Preformed Joint Sealants:

1. Applications:

a. Control and expansion joints in cast-in-place concrete.
b. Joints between [architectural] [structural] precast concrete units.
c. Control and expansion joints in unit masonry.
d. Control and expansion joints in stone masonry.
e. Butt joints between metal panels.
f. Joints between different materials listed above.
g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
h. Control and expansion joints in soffits and overhead surfaces.
i. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.
j. Joints between EIFS and other materials.

G. Interior Prison Security Sealants:

1. Applications:

a. Control and expansion joints on exposed interior surfaces of exterior walls, and at inmate/secure areas.
b. Perimeter joints on exposed interior surfaces of exterior openings.
c. Joints on precast walls, ceiling, and floor joints at inmate/secure areas.
d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, and similar openings, and at inmate/secure areas.
e. Other interior joints in vertical surfaces and non-traffic horizontal surfaces subject to movement for which no other sealant is specified, and at inmate/secure areas.
f. Joints between plumbing fixtures and adjacent materials at inmate/secure areas.
g. Joints between locker room lockers and adjacent materials.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

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. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Factory finishing hollow metal doors and frames and factory machining for hardware.
4. Louvers installed in hollow metal doors
5. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Sections “Flush Wood Doors", "Clad Wood Doors”, and "Stile and Rail Wood Doors" for wood doors in hollow metal frames.
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Sections "Door Hardware" and "Access Control Hardware" for door hardware for hollow metal doors and frames.
5. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
6. Division 26 "Electrical" Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.
7. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access control system.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.

4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ANSI/SDI A250.13 - Testing and Rating of Sever Windstorm Resistant Components for Swing Door Assemblies.
7. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
8. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
10. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
11. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
12. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Doors Under Specified Pressure Differences Across the Specimens.
13. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
14. ASTM E 413 - Classification for Rating Sound Insulation.
15. ASTM E1332 - Standard Classification for Determination of Outdoor-Indoor Transmission Class.
16. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
17. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes.
18. ANSI/NAMM/HMMA 867-06 - Guide Specifications for Commercial Laminated Core Hollow Metal Doors and Frames.
19. ANSI/BHMA A156.15 - Hardware Preparation in Steel Doors and Frames.
20. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
21. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
22. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
23. FEMA 361 2008 – Design and Construction Guidance for Community Safe Rooms
24. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
25. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
26. TAS-201-94 - Impact Test Procedures.
27. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
28. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
29. UFC 4-010-0 - Department of Defense Minimum Antiterrorism Standards for Building, October 2003, including Change 1, January 2007.

30. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 10B - Fire Test of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.
8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of the Steel Door Institute.

E. Informational Submittals:

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C..

1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.

2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control Door Assemblies: Comply with NFPA 105.

    a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

E. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.

1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:

    a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.29, R-Value 3.4, including insulated door, thermal-break frame and threshold.

2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:

    a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).

F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. CECO Door Products.
   2. Curries Company.
   3. Steelcraft.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

B. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
4. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Manufacturers Basis of Design:
1. Curries Company (CU): 707 Series.

2.4 ENERGY EFFICIENCY HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design specified, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.

1. Design: Flush panel.

2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 "Laminated Core".

    a. Provide 22 gauge steel stiffeners at 6 inches on-center internally welded at 5" on- center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.
    b. Thermal properties to rate at a fully operable minimum U-Factor 0.29 and R-Value 3.4, including insulated door, thermal-break frame and threshold.

3. Level/Model: Level 2 and Physical Performance Level A (Extra Heavy Duty), Minimum 18 gauge (0.042 inch - 1.1-mm) thick steel, Model 2.
4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Manufacturers Basis of Design:
    1. Curries Company (CU) - 777 Trio-E Series.

2.5 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

    1. Fabricate frames with mitered or coped corners.
    2. Fabricate frames, with the exception of slip-on drywall types, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
    3. Frames for Level 2 Steel Doors: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
    4. Frames for Level 3 Steel Doors (up to 48 inches in width): Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.]
    5. Frames for Level 3 Steel Doors (48 inches and up in width): Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.]
    6. Frames for Wood Doors: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
    7. Frames for Borrowed Lights: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
    8. Manufacturers Basis of Design:

a. Curries Company (CU) - M Series.

C. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 ENERGY EFFICIENCY HOLLOW METAL FRAMES

A. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames, with the exception of knock down types, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
3. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
4. Thermal Break Frames: Provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate from minimum 16 gauge galvannealed steel, with positive 3/8" vinyl thermal break and integral vinyl weatherstripping.

5. Manufacturers Basis of Design:

a. Curries Company – Thermal Break M Series.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud Wall Type: Designed to engauge stud and not less than 0.042 inch thick.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.8 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.9 LOUVERS

A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide door manufacturers standard louver to meet rating indicated.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.10 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

E. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.

2.11 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.12 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicted.
3. Louvers: Factory cut openings in door and install louvers into prepared openings where indicated.
4. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
5. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimensions on glass side of frame.
5. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.

6. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
7. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes) and standardized Molex™ plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
8. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".

    a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
    c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
    d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
10. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".

12. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.13 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

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

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 8 Section “Door Hardware” for hardware requirements.
2. Division 8 Section "Glazing" for glass view panels in flush wood doors.
3. Division 8 Section “Hollow Metal Doors and Frames.”

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate doors to be factory finished and finish requirements.
4. Indicate fire ratings for fire doors.

C. Door Schedule: Use **SAME** reference designations indicated on Drawings in preparing schedule for doors and frames.

D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:

1. Faces of Factory-Finished Doors: Show the full range of colors available for stained finishes.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with WDMA Architectural Woodwork Quality Standards Illustrated.

1. Provide WDMA Quality Certification Labels or a WDMA letter of licensing for Project indicating that doors comply with requirements of grades specified.

2. When requested, provide evidence that the installer has successful experience completing projects of similar scope and with products as specified herein.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist), or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:

a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, only the following manufacturers' products may be incorporated into the Work:

1. Flush Wood Doors:
   a. Algoma Hardwoods Inc.
   b. Eggers Industries; Architectural Door Division.
   c. Lambton
   d. Marshfield.
   e. Oshkosh
   f. Graham
   g. VT Industries

B. Manufacturers other than those listed above will not be accepted – no substitutions will be allowed.

2.2 DOOR CONSTRUCTION, GENERAL

A. Doors for Transparent Finish:

1. Grade: Premium, with Grade A faces.
2. Species and Cut: Red oak, plain sliced.
3. Veneer flitch match: Book match, running match.
4. Pair Match: Provide for doors hung in same opening or separated only by mullions.
5. Stiles: Same species as faces or a compatible species.

2.3 SOLID-CORE DOORS

A. Particleboard Cores: Comply with the following requirements:

1. Particleboard: ANSI A208.1, Grade LD-2, 32 lb. density.
2. Blocking: Provide solid wood blocking in particleboard-core doors for installation of hardware.

B. Interior Veneer-Faced Doors:

1. Core: Particleboard.
2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed and then veneered or laminated in a one-step hot press method.

C. Fire-Rated Doors:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated for installation of hardware.

a. Doors with exit devices provide top rail, bottom rail and 5 x 10 right and left lock blocks.

3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
4. Pairs: Furnish formed-steel edges and astragals with intumescent seals for pairs of fire-rated doors, unless otherwise indicated.

   a. Finish steel edges and astragals with baked enamel.

5. Pairs with Surface Mounted Panic Devices: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.

6. Intumescent Seals For Fire Rated Doors: Category "A" doors with concealed intumescent.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors:

   1. Wood Species: Same species as door faces.
   2. Profile: Flush rectangular beads.
   3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

   1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

   1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2.6 FACTORY FINISHING

A. General: Comply with WDMA Architectural Woodwork Quality Standards Illustrated for factory finishing.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: WDMA System TR-6 catalyzed polyurethane, or UV cured polyurethane.
3. Staining: Match existing wood doors.
4. Effect: Open-grain finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects, and replace at no cost to Owner.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 084100 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Exterior Storefront Systems (Windows)

B. Related sections include the following:

1. Division 7 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.
2. Division 8 Section "Glazing."

1.3 SYSTEM DESCRIPTION

A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:

1. Air infiltration and water penetration exceeding specified limits.
2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.

1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
2. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating

components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
b. Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.

E. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.

1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
2. Provide a minimum 1/16-inch clearance between members and operable windows and doors.

F. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.

G. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.

H. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:

1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

I. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

J. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

K. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.

L. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.1.

M. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.4 SUBMITTALS

A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

D. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

F. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.

1. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM E 699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.

D. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.7 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including, but not limited to, excessive deflection.
2. Adhesive sealant failures.
3. Cohesive sealant failures.
4. Failure of system to meet performance requirements.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6. Failure of operating components to function normally.
7. Water leakage through fixed glazing and frame areas.

C. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Kawneer Company, Inc. 2" x 4-1/2" "TriFab 451T for Exterior Windows Basis of Design)
   2. EFCO Corporation
   3. Butler Manufacturing Company; Vistawall Architectural Products.
   4. YKK AP America Inc.
   5. TRACO

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

   1. Sheet and Plate: ASTM B 209.
   2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
   3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Steel Reinforcement: Complying with ASTM A 36 for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 for hot-rolled sheet and strip.

C. Glazing as specified in Division 8 Section "Glazing."

D. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

E. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

F. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

G. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."

2.3 COMPONENTS

A. Window framing components: Provide manufacturers standard components to comply with the following level of quality standard:

1. Kawneer Tri-Fab 450 for interior framing and 451T for exterior framing with insulated glass.
2. Venting Units, where indicated to be Kawneer Glassvent.

B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Reinforce members as required to retain fastener threads.
2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.

F. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:

1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.
2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

2.4 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1. Fabricate components for screw-spline frame construction.
2. Fabricate components for shear-block frame construction.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Class I, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

2.6 STEEL PRIMING

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.

B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.

1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

G. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

H. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:

1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.3 ADJUSTING AND CLEANING

A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.

B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08410

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.
b. Other doors to the extent indicated.

2. Cylinders for doors specified in other Sections.
3. Electrified door hardware.

B. Related Sections include the following:

1. Division 8 Section "Standard Steel Doors and Frames"
2. Division 8 Section "Flush Wood Doors"
3. Division 8 Section "Aluminum-Framed Entrances and Storefronts"
4. Division 16 Sections for connections to electrical power system and for low-voltage wiring work.

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: Power, signal, and control wiring. Include the following:

a. System schematic.
b. Point-to-point wiring diagram.
c. Riser diagram.
d. Elevation of each door.

2. Detail interface between electrified door hardware and fire alarm, access control, and intrusion detection system.

3. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

C. Samples for Initial Selection: For each finish, color, and texture required for each type of door hardware indicated.

D. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.

1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

E. Product Certificates: For electrified door hardware, signed by product manufacturer.

1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

F. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedules.

G. Warranty: Special warranty specified in this Section.

H. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of an Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
c. Content: Include the following information:

1) Identification number, location, hand, fire rating, and material of each door and frame.
2) Type, style, function, size, quantity, and finish of each door hardware item.
3) Complete designations of every item required for each door or opening including name and manufacturer.
4) Fastenings and other pertinent information.
5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) Door and frame sizes and materials.
9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

10) List of related door devices specified in other Sections for each door and frame.

d. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

e. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

2. Keying Schedule: Prepared by or under the supervision of an Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.

1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
2. Installer shall have warehousing facilities in Project's vicinity.
3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
4. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of

manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NPFA252 and UL10C.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1016 mm) or less above the sill.

E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include supplier's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

H. Electrical pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to electrified door hardware including, but not limited to, the following:

1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.

2. Review sequence of operation for each type of electrified door hardware.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and/or permanent cores to Owner by registered mail or overnight package service.

1.6 COORDINATION

A. Coordinate layout and installation of recessed pivots and floor closers with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system, access control system and security system.

D. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions, and to provide for proper operation and overall finish.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of operators and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: One year from date of Substantial Completion, except as follows:

a. Exit Devices: Three years from date of Substantial Completion.
b. Manual Closers: Ten years from date of Substantial Completion.
c. Mortise Locks: Five years from date of Substantial Completion.
d. Cylindrical locks: Three years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets".

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' product.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing

minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.

2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For doors with heights up to 60 inches.
2. Three Hinges: For doors with heights 61 to 90 inches.
3. Four Hinges: For doors with heights 91 to 120 inches.
4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Weight: Provide the following:

1. Doors over 3'0 wide and where specified: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Standard-weight hinges.

D. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Stainless Steel.
2. Interior Hinges: Steel
3. Hinges for Fire-Rated Assemblies: Steel, or Stainless Steel

2.3 HINGES AND CONTINUOUS HINGES

A. Butts and Hinges: BHMA A156.1.

B. Continuous Hinges: BHMA A156.26

C. Template Hinge Dimensions: BHMA A156.7.

D. Manufacturers:

1. H. B. Ives, an Ingersoll-Rand Company (specified).
2. Hager Companies.
3. McKinney Products Company; an ASSA ABLOY Group Company.
4. Select Products Limited.
5. Stanley Commercial Hardware; Div. of The Stanley Works.

2.4 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Comply with ANSI A117.1

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101.

C. Lock Trim: Provide as shown in the hardware sets.

D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors.

E. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

2.5 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:

1. Cylindrical Locks: BHMA A156.2
2. Mortise Locks: BHMA A156.13

B. Manufacturers:
1. Cylindrical: Schlage Lock Company ND Series (specified – School District Standard)

2.6 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors.

B. Flush and Surface Bolts: BHMA A156.16.

1. Manufacturers:
   1. Ives Hardware, an Ingersoll-Rand Company (specified).
   2. Rockwood Manufacturing Company.
   3. McKinney Products Company, an ASSA ABLOY Group Company.

2.7 EXIT DEVICES

A. Exit Devices: BHMA A156.3 Grade 1.

B. Accessibility Requirements: Comply with ANSI A117.1.

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101.

D. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

E. Removable Mullions: BHMA A156.3. Steel removable mullions at all exterior doors.

F. Outside Trim: As shown in the hardware sets.

G. Manufacturers:

1. Von Duprin, an Ingersoll-Rand Company (Specified - School District Standard).

2.8 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Six

2. Keyway: Schlage Lock – Existing Keyway

3. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.

4. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

C. Construction Keying: Comply with the following:

1. Furnish brass construction cores for all locks and cylinders. Plastic construction cores are not acceptable.

2. Furnish ten construction master keys and two construction control keys

D. Manufacturer: Schlage Lock Compay – Existing Key System (School District Standard).

2.9 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:

1. Existing System: Master key or grand master key locks to Owner's existing Schlage factory key system.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key as directed by owner and include the following notation:

a. Notation: "Do Not Duplicate"

2. Quantity: In addition to one extra key blank for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.
d. Great-Grand Master Keys: Five.
e. Emergency Keys: Ten

2.10 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Manufacturers:
   a. Lund Equipment Co., Inc.
   b. MMF Industries

2.11 ELECTRIC STRIKES

A. Standard: BHMA A156.31 Grade 1

B. General: Use fail-secure electric strikes with fire-rated devices and at all exterior door locations.

C. Manufacturers:
1. Von Duprin, an Ingersoll-Rand Company (specified for use at all single doors and pairs of doors without mullions).
2. Folger Adam, an ASSA ABLOY Group Company.

2.12 OPERATING TRIM

A. Standard: BHMA A156.6 .

B. Materials: Fabricate from stainless steel, unless otherwise indicated.

C. Manufacturers:
   1. Ives Hardware, an Ingersoll-Rand Company (specified).
   2. Rockwood Manufacturing Company.
   3. McKinney Products Company, an ASSA ABLOY Group Company.

2.13 CLOSERS

A. Accessibility Requirements: Comply with ANSI A117.1

B. Door Closers for Means of Egress Doors: Comply with NFPA 101.

C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

D. Furnish any necessary plates, brackets, or spacers as required to properly install the door closers based upon the conditions shown on the drawings.

E. Surface Closers: BHMA A156.4 Grade 1. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated. Provide plates, brackets and spacers as necessary to suit door and frame conditions.

   1. Manufacturers:
      a. LCN Closers, an Ingersoll-Rand Company (specified – School District Standard).

F. Overhead Stops: BHMA A156.8

   1. Manufacturers:
      a. Glynn Johnson, an Ingersoll-Rand Company (specified).
      b. Rixson Specialty Door Controls, an ASSA ABLOY Group Co.
      c. Sargent Manufacturing, an ASSA ABLOY Group Co.

2.14 PROTECTIVE TRIM UNITS

A. Size: 2 inches (38 mm) less than door width on push side and 1" (13 mm) less than door width on pull side, by height specified in door hardware sets.

   1. Material: 0.050-inch- (1.3-mm-) thick Stainless Steel

2. Manufacturers:
    1. Ives Hardware, an Ingersoll-Rand Company (specified).
    2. Rockwood Manufacturing Company.
    3. McKinney Products Company, An ASSA ABLOY Group Company.

2.15 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16

1. Provide wall stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Electromagnetic Door Holders: BHMA A156.15.

1. Coordinate with fire detectors and interface with fire alarm system for labeled fire door assemblies.

C. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

D. Manufacturers:

1. Glynn-Johnson, an Ingersoll-Rand Company. (specified).
2. McKinney Products Company, an ASSA ABLOY Group Company.
3. Rixson Specialty Door Controls.
4. Rockwood Manufacturing Company.
5. Sargent Manufacturing Company, an ASSA ABLOY Group Company.

2.16 THRESHOLDS AND DOOR GASKETING

A. Standard: BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

E. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated.

F. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

G. Manufacturers:
1. McKinney Products, an ASSA ABLOY Group Company.
2. National Guard Products (specified).
3. Pemko Products, an ASSA ABLOY Group Company.
4. Reese Enterprises.

2.17 MISCELLANEOUS DOOR HARDWARE

A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; and listed and labeled for use with fire alarm systems.

2.18 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

2.19 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 Series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated on drawings unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and

reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

D. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, verify location with Architect.

1. Configuration: Provide one power supply for each door opening, unless indicated otherwise in the hardware sets.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Hardware installed on “existing to remain” wood and steel door frames:

1. Rework existing frames as required to accept hardware. Prep existing frames for mortise strikes as required for new hardware.
2. Fill, patch and finish, to the satisfaction of the Architect, all screw holes and hardware mortises in existing frames not concealed by new hardware.
3. Fill, patch and finish, to the satisfaction of the Architect, prep in floor/slab that results from removing existing floor closers.
4. Adequately reinforce existing wood frames as required for new hardware.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final

operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 1 Section "Demonstration and Training."

3.8 DOOR HARDWARE SETS

HW SET: 100
DOOR NUMBER: 100

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	EL35A-NL-OP	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	OFFSET DOOR PULL	8190-18-O- 3/8" FASTENERS	630	IVE
1	EA	SURFACE CLOSER	4111 EDA-ST2730	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30	689	LCN
1	EA	BLADE STOP SPACER	4110-61	689	LCN
1	EA	OVERHEAD STOP	900S	630	GLY

1	EA	DOOR SWEEP	600A	CL	NGP
1	EA	THRESHOLD	613-RCE	AL	NGP
1	EA	DOOR POSITION SWITCH	679-05 HM		SCE

DOOR OPERATION: Door is normally closed and secure.

HW SET: 108
DOOR NUMBER: 108

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM SEC LOCK	ND75PD RHO	626	SCH
1	EA	SURFACE CLOSER	4111 HCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	5020B	BRN	NGP

END OF SECTION

SECTION 088000 – GENERAL GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Interior borrowed lites.
4. Glazed aluminum entrances and storefronts.
5. Skylights.

B. Related Sections include the following:

1. Division 8 Section "Aluminum Entrances and Storefronts."
2. Division 8 Section “Aluminum Windows.”
3. Division 8 Section “Aluminum Sliding Windows.”
4. Division 8 Section "Flush Wood Doors."
5. Division 8 Section "Steel Doors and Frames."
6. Division 8 Section “Metal Framed Skylights.”
7. Division 8 Section “Fire-Rated Glazing”
8. Division 8 Section “Fire-Rated Aluminum Windows” for glazing in rated aluminum windows.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass or fabricated glass as defined in referenced glazing publications.

B. Glazing Fabricators: Firms that produce fabricated glass products from primary glass as defined in referenced glazing publications.

C. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

D. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

E. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to fabricator's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to fabricator's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

G. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to fabricator's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300 and ICC's 2006 International Building Code according to the following requirements:

   a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.

      1) Wind Design Data: As indicated on the Drawings.
      2) Basic Wind Speed: 90 mph
      3) Importance Factor: 1.15
      4) Exposure Category: C

   b. Specified Design Snow Loads: As indicated on Drawings, but not less than snow loads applicable to Project, required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7, "Snow Loads".

c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

1) Load Duration: 60 seconds or less.

d. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.

e. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.

f. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

g. Minimum Glass Thickness for Exterior Lites:

1) Manufacturer's standard to meet wind load criteria, but not less than 6 mm.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Performance Characteristics: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal ½-inch-wide interspace.
3. Center-of-Glass thermal and optical performance properties shall be based on data and calculations from the current LBNL Windows 5.2 computer program expressed as Btu/sq. ft. x h x deg F.
4. Fenestration Performance: Performance values that take into account the total fenestration (Center-of-Glass and framing members) normally identified with building energy codes such as ASHRAE-IESNA 90.1 and the IECC. Values can also be tested and certified by the National Fenestration Rating Council (NFRC).

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: Provide 12-inch-square samples of each glass product specified.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

G. Product Test Reports: From a qualified testing agency, indicating the specified products comply with requirements based on comprehensive testing of standard products. Provide product test reports for each glass product.

H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Monolithic Float Glass: Obtain all monolithic float glass from one source from a single manufacturer.

C. Source Limitations for Insulating Glass: Obtain all insulating-glass units from one source from a single fabricator using the same type of glass and other components for each type of unit indicated.

D. Source Limitations for Laminated Glass: Obtain all laminated glass units from one source from a single fabricator using the same type of glass and other components for each type of unit indicated.

E. Source Limitations for Glazing Accessories: Obtain all glazing accessories from one source from a single manufacturer for each product and installation method indicated.

F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are

indicated. Refer to the following publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual", "Sealant Manual" and "Laminated Glass Design Guide."
2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."
3. IGMA Publication for Insulating Glass: SIGNA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
4. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."

H. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:

1. Insulated Glass Certification Council (IGCC)

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass fabricator agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass fabricator agreeing to furnish replacements for coated-glass that deteriorates as defined in "Definitions" Article within specified warranty period indicated below. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as required by applicable glazing code.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 3 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

2.2 MANUFACTURERS AND FABRICATION

A. Available Products: Subject to compliance with requirements, manufacturers of products that may be incorporated into the Work include, but are not limited to, the following:

1. Monolithic Float Glass

a. PPG Industries, Inc.
b. Guardian Industries, Inc.
c. Pilkington, Inc.
d. ACH (formerly Visteon).

B. Available Fabricators: Subject to compliance with requirements, fabricators of the products specified include, but are not limited to, the following:

1. J. E. Berkowitz, L.P. (800) 257-7827
2. Viracon, Inc.
3. Arch Aluminum, Inc.
4. Oldcastle Glass

2.3 MONOLITHIC FLOAT GLASS

A. Float Glass: ASTM C 1036, Type 1, Class 1 (clear), Class 2 (tinted) transparent glass, flat, Quality q3 (glazing select); class, kind and condition indicated.

2.4 HEAT-TREATED FLOAT GLASS

A. Heat-Treated Float Glass: ASTM C 1048; Type I; Class I (clear), and Class 2 (tinted, to match paragraph 2.5 – outboard lites) transparent glass, flat, Quality q3 (glazing select); class, kind, and condition as required by the applicable glazing code.

B. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

1. Flatness Tolerances

a. Roller-Wave or Ripple: Deviation from flatness at any peak shall be targeted not to exceed 0.003" as measured per peak to valley for ¼" (6 mm) thick glass.
b. Bow and Warp: The bow and warp tolerances targeted shall not exceed 1/32" per linear foot.

C. Tinted Heat-Treated Float Glass: For use in door and frame D150A and frames D150B and D150C, provide glass that complies with paragraph B above and, in addition, is tinted dark grey and has a reflective costing on one surface.

2.5 INSULATING GLASS

A. Tinted Insulating Glass Units – General: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 2190 for Class CBA units and with requirements specified in this Article.

1. Type IG-1 Insulated Glass: Insulated glass units consisting of two lites of annealed glass separated by a ½-inch sealed air space. Provide insulated units with low "E" coating.

a. Basis-of-Design Product: Subject to compliance with requirements, provide units fabricated with the following characteristics:

1) Visible Light Transmittance: 8%
2) Winter Night-time U Value: .49

3) Summer Day-time U Value: .57
4) Shading Co-efficient: .55

b. Insulating Glass Unit Make-up

1) Outboard Lite: tinted 30% medium grey, or bronze (the Owner's choice), ¼-inch thick.
2) Low "E" coating on 2nd. surface.
3) ½-inch thick desiccant filled aluminum spacer.
4) Inboard Lite: ¼-inch thick clear glass.
5) Overall Thickness: 1-inch

2. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article.
3. Provide Kind FT (fully tempered) where safety glass is required by the applicable glazing codes.
4. Locations: Insulating glass shall be used in all exterior windows, storefronts/entrances, windows/vents and doors. Insulating glass in doors and sidelites (below the door head-height) and other locations indicated on the drawings or required by applicable code, shall consist of tempered glass.

B. Sealing System: Dual seal, with primary and secondary sealants as follows:

1. Dual air seal of polyisobutylene (PIB), and secondary seal of silicone.

C. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

1. Spacer Material: Aluminum with mill or clear-anodized finish.
2. Desiccant: Molecular sieve or silica gel, or blend of both.
3. Corner Construction: Manufacturer's standard corner construction.

2.6 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rods as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. VOC Content: For Sealants used inside weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, subpart D.

C. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

D. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

E. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.9 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 088000

SECTION 092550 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Nonload-bearing steel framing members for gypsum board assemblies.
2. Gypsum board assemblies attached to steel framing.
3. Glass fiber reinforced gypsum.
4. Tile backing panels installed with gypsum board assemblies.
5. Metal trim and accessories for finishing gypsum board.
6. Sound Attenuation Blankets.
7. Acoustical Sealant.
8. Weatherproof Sealant.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 6 Section "Rough Carpentry" for wood framing and furring.
2. Division 7 Section “Through-Penetration Firestop Systems” for firestopping systems and fire-resistance-rated joint sealants.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

B. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Product certificates signed by manufacturers of gypsum board assembly components certifying that their products comply with specified requirements.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.

B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:
   1. Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 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 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.

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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Steel Framing and Furring:
      a. Dale Industries, Inc.
      b. Dietrich Industries, Inc.
      c. Marino/Ware (formerly Marino Industries Corp.).
      d. National Gypsum Co.; Gold Bond Building Products Division.
      e. Unimast, Inc.
   2. Gypsum Board and Related Products:
      a. United States Gypsum Co.
      b. National Gypsum Co.; Gold Bond Building Products Division.
      c. Georgia-Pacific Corp.
      d. Domtar Gypsum.
   3. Drywall Trims
      a. United States Gypsum Co.
      b. National Gypsum Co.
      c. Georgia Pacific Corp.
      d. Fry Reglet - Heavy Duty Corner Trim

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
   1. Standard Gypsum Wallboard
      a. ToughRock; Georgia-Pacific Corp.
      b. SHEETROCK Brand Gypsum Panels; United States Gypsum Company
      c. Gold Bond Wallboard; National Gypsum Co.
   2. Fire Rated Gypsum Wallboard
      a. ToughRock; Georgia-Pacific Corp.
      b. SHEETROCK Brand Gypsum Panels; United States Gypsum Company
      c. Gold Bond Wallboard; National Gypsum Co.
   3. Sag Resistant Gypsum Wallboard (for use at all gypsum wallboard ceilings)
      a. GyProc CD Ceiling Board; Georgia-Pacific Corp.
      b. SHEETROCK Brand Interior Gypsum Ceiling Board; United States Gypsum Company
      c. Gold Bond High Strength Ceiling Board; National Gypsum Co.

4. Tile Backer Board
   a. Dens-Shield Tile Backer; Georgia-Pacific Corp.
5. Foil-Back Gypsum Panels (with integral vapor retarder)
   a. SHEETROCK Brand Foil-Back Gypsum Panels; United States Gypsum Company.
6. Exterior Grade Gypsum Wallboard Sheathing
   a. DensGlass Gold; Georgia-Pacific Corp.
7. Abuse-Resistant Gypsum Wallboard
a. Category 3, Heavy Duty; United States Gypsum.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

A. General: Provide components complying with ASTM C 754 for conditions indicated. Also applies to metal soffit framing.

B. Wire Ties: ASTM A 641, Class 1 zinc coating, soft temper, 0.062 inch thick.

C. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.

D. Channels: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch- wide flanges, and as follows:
   1. Carrying Channels: 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.
   2. Furring Channels: 3/4 inch deep, 300 lb/1000 feet, unless otherwise indicated.
   3. Finish: ASTM A 653, G 60 hot-dip galvanized coating for framing for exterior soffits and where indicated.

E. Steel Studs for Furring Channels: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:
   1. Thickness: 22 gauge, unless otherwise indicated.
   2. Depth: 2-1/2 inches, unless otherwise indicated.
   3. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating.
   4. Protective Coating: Manufacturer's standard corrosion-resistant coating.

F. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth of 7/8 inch, or 1-1/2 inches, as indicated, and minimum thickness of base (uncoated) metal as follows:
   1. Thickness: 22 gauge, unless otherwise indicated or if span of furring channel, depending on its use, requires a heavier gauge.
   2. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating.
   3. Protective Coating: Manufacturer's standard corrosion-resistant coating.

G. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2-inch- deep channel of the following configuration:
   1. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

A. General: Provide steel framing members complying with the following requirements:
   1. Protective Coating: Manufacturer's standard corrosion-resistant coating.

B. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:
   1. Thickness: 22 gauge unless otherwise indicated or if span of studs, depending on its use, requires a heavier gauge. Use 20 gauge where tile backer board is used or where required by code or UL classifications.
   2. Depth: 1-5/8 inches, where indicated.
   3. Depth: 2-1/2 inches, where indicated.
   4. Depth: 3-5/8 inches, where indicated.
   5. Depth: 4 inches, where indicated
   5. 6. Depth: 6-inches, where indicated
   6. 7. Depth: Other depths as indicated in drawings.

C. Deflection Track: Manufacturer's standard top runner designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A 653 or ASTM A 568. Thickness as indicated for studs, and width to accommodated depth of studs, and of the following configuration:
   1. Top runner with 2-1/2-inch- deep flanges that either have V-shaped offsets that compress when pressure is applied from construction above or have slots 1 inch o.c. that allow fasteners attached to studs through the slots to accommodate structural movement by slipping.
      a. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
         1) Superior Flex Track System (SFT); Delta Star, Inc.
         2) SLP-TRK; Metal-Lite, Inc.

D. Deflection and Firestop Track: Top runner designed to allow partition heads to expand and contract with movement of structure above while maintaining continuity of the assembly. Comply with requirements of ASTM C 645 except configuration, of thickness indicated for studs and width to accommodate depth of studs indicated with flanges offset at midpoint to accommodate gypsum board thickness.
   1. Offset Configuration: Reveal design with offset recessing in from depth of stud.
      a. Available Product: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to:
         1) "Fire Trak"; Fire Trak Corp.

E. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth and minimum thickness of base (uncoated) metal as follows:
   1. Thickness: 0.0179 inch, unless otherwise indicated.
   2. Depth: 7/8 inch, or 1-1/2 inches, as indicated.

F. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated)

metal of 0.0329 inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.

G. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2-inch- deep channel of the following configuration:
   1. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).

H. Steel Channel Bridging: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch- wide flanges, 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.

I. Steel Flat Strap and Backing Plate: Steel sheet for blocking and bracing complying with ASTM A 653 or ASTM A 568, length and width as indicated, and with a minimum base metal (uncoated) thickness as follows:
   1. Thickness: 0.0598 inch unless indicated otherwise.

J. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.4 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.
   1. Widths: Provide gypsum board in widths of 48 inches.

B. Gypsum Wallboard: ASTM C 36 and as follows:
   1. Type: Regular for vertical surfaces, unless otherwise indicated.
   2. Type: Type X where required for fire-resistance-rated assemblies.
   3. Type: Sag-resistant type for ceiling surfaces.
   4. Edges: Tapered.
   5. Thickness: 5/8 inch, where indicated.

C. Tile Backer Board: ASTM C 1178
   1. Type: Regular for vertical surfaces, unless otherwise indicated.
   2. Type: Type X where required for fire-resistance-rated assemblies.
   3. Edges: Square.
   4. Thickness: 5/8 inch for tile backer board and ½ inch for sound deadening board where indicated.

D. Foil-Back Gypsum Panels: ASTM E 96 and as follows:

   1. Type: Sag-resistant type for ceiling surfaces.
   2. Edges: Tapered.

3. Thickness: 5/8 inch, where indicated.

E. Exterior Grade Gypsum Wallboard Sheathing: ASTM C 1177 with glass mats both sides and long edges, water-resistant treated core and as follows:
   1. Type: Regular for vertical surfaces, unless otherwise indicated.
   2. Edges: Square.
   3. Thickness: 5/8 inch, where indicated.

F. Abuse-Resistant Gypsum Wallboard: ASTM E 695, modified ASTM D4977 and ASTM D5420.
   1. Type: Regular for vertical surfaces, unless otherwise indicated.
   2. Type: Type x where required for fire-resistance-rated assemblies.
   3. Edges: Tapered.
   4. Thickness: 5/8 inch, unless otherwise noted.
   5. For use at bulkhead at operable partition between Gymnasium and Auxiliary Gymnasium.

2.5 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead, edge trim, reveals, and control joints complying with ASTM C 1047 and requirements indicated below:
   1. Material: Formed metal, with metal complying with the following requirements:
      a. Steel sheet zinc coated by hot-dip process or rolled zinc.
      b. Steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.
   2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
      a. Heavy duty outside corner trim as manufactured by Fry Reglet for all vertical outside corners in traffic areas. Use small nose cornerbead with perforated flanges on curved corners.
      b. Cornerbead on outside corners, in non-traffic areas.
      c. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
      d. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
      e. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

2.6 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

C. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
2. For topping compound, use sandable formulation.

D. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
1. Ready-Mixed Formulation: Factory-mixed product.
   a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
   b. Topping compound formulated for fill (second) and finish (third) coats.
   c. All-purpose compound formulated for both taping and topping compounds.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:
1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

C. Available Products: Subject to compliance with requirements, acoustical sealants that may be incorporated in the Work include, but are not limited to, the following:
1. Acoustical Sealant for Exposed Joints:
   a. PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
   b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
   c. SHEETROCK Acoustical Sealant; United States Gypsum Co.
2. Acoustical Sealant for Concealed Joints:
   a. BA-98; Pecora Corp.
   b. Tremco Acoustical Sealant; Tremco, Inc.

2.8 WEATHERPROOF SEALANT

A. Weatherproof Sealant, one-part high-performance elastomer. Sealant to be a one-part moisturecuring, gun grade polyurethane sealant for use with foil-back gypsum panels installed below light gauge metal trusses. See drawings for exact locations.

B. Available Products: Subject to compliance with requirements, weatherproof sealants that may be incorporated in the Work include, but are not limited to, the following:
1. Weatherproof Sealant:
   a. Vulkem 116; Tremco Inc.
   b. Similar product by Pecora Corp.

2.9 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

C. Steel drill screws complying with ASTM C 1002 for the following applications:
   1. Fastening gypsum board to steel members less than 0.033 inch thick.

D. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

E. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

F. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit metal stud size indicated.

G. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).
   1. Mineral-Fiber Type: Fibers manufactured from glass.

PART 3 - EXECUTION

3.1 EXAMINATION

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.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."
   1. Use steel flat strap and backing plate as blocking and bracing for the support of above listed items.

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.
   1. Where building structure abuts ceiling perimeter or penetrates ceiling.
   2. Where partition framing and wall furring abut structure, except at floor.
      a. Install deflection track top runner to attain lateral support and avoid axial loading.
      b. Install deflection and firestop track top runner at fire-resistance-rated assemblies.
         1) Attach jamb studs at openings to tracks using manufacturer's standard stud clip.

D. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Suspend ceiling hangers from building 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 structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
   3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
   4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
   5. Do not attach hangers to steel deck tabs.

6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Sway-brace suspended steel framing with hangers used for support.

C. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
1. Wire Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

D. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.
1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at, or within 12 inches above, suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
1. Cut studs short of full height in accordance with deflection track manufacturer's installation instructions to provide perimeter relief.
2. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

D. Terminate partition framing at, or within 12 inches above, suspended ceilings where indicated.

E. Install steel studs and furring in sizes and at spacings indicated.
   1. Single-Layer Construction: Space studs and furring 16 inches o.c., unless otherwise indicated.

F. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

G. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   1. Install 2 studs at each jamb, unless otherwise indicated.
   2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
   3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

H. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

3.6 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Install abuse-resistant gypsum wall board at the following locations:
   1. Corridor walls full height to above finished ceiling. Standard gypsum wallboard can be used for bulkheads and/or soffits 8'-0" ± or higher above finished floor in corridors.
   2. Classroom walls not protected by casework. Where protected by casework the full length of wall, use standard gypsum wallboard.

C. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side. Install sound attenuation blankets to full height of metal framing, or to deck above (whichever is the highest).

D. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

E. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

F. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints.

Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

G. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

H. Attach gypsum panels to framing provided at openings and cutouts.

I. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

J. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

K. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.
   1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

L. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors. Unless detailed otherwise, provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

M. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

N. Where installing foil-backed gypsum panels on metal furring channels under light gauge metal trusses, provide weatherproof sealant between panels for a moisture resistant seal between panels. In addition, provide weatherproof sealant around all penetrations through foil-backed gypsum panels.

N. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
   1. Space screws a maximum of 12 inches o.c. for vertical applications.

O. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.7 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:
   1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless parallel application is required for fire-resistance-rated assemblies. Use maximum-length panels to minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of board.

B. Multi-Layer Application: Install gypsum wallboard panels as follows:
   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
   2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

C. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
   1. Fasten with screws.

D. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.8 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install cornerbead at external corners. Install heavy duty corner beads at all vertical outside corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
   1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
   2. Install L-bead where edge trim can only be installed after gypsum panels are installed.

D. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

D. 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 and where indicated.
   3. Level 4 for gypsum board surfaces exposed to view, unless otherwise indicated.
   4. Level 5 for gypsum board surfaces exposed to view where Abuse-Resistant Gypsum Wallboard is used.

E. Use one of the following joint compound combinations as applicable to the finish levels specified:
   1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Sandable, setting-type joint compound.
   2. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.
   3. Embedding and First Coat: Ready-mixed, drying-type, all-purpose or taping compound. Fill (Second) Coat: Ready-mixed, drying-type, all-purpose or topping compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.

F. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.

G. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply a separate first coat of joint compound to tape, fasteners and trim flanges.

H. Where Level 4 gypsum board finish is indicated, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

3.10 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Architect will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
   1. Notify Architect one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.
   2. Prior to notifying Architect, complete the following in areas to receive gypsum board ceilings:
      a. Installation of 80 percent of lighting fixtures, powered for operation.
      b. Installation, insulation, and leak and pressure testing of water piping systems.
      c. Installation of air duct systems.
      d. Installation of air devices.
      e. Installation of mechanical system control air tubing.
      f. Installation of ceiling support framing.

3.11 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 092550

SECTION 093000 – TILING

PART 1 - TILING

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. Ceramic tile
2. Stone thresholds.

B. Related Sections:

1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Division 9 Section “Gypsum Board” for tile backing panels.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product, signed by product manufacturer.

D. Material Test Reports: For each tile-setting and grouting product.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Stone thresholds.
2. Joint sealants.
3. Metal edge strips.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of wall tile installation.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.2 TILE PRODUCTS

A. Tile Type CT: Unglazed Mosaic Floor Tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Dal-Tile International Inc., Series: Keystones Colorbody Porcelain

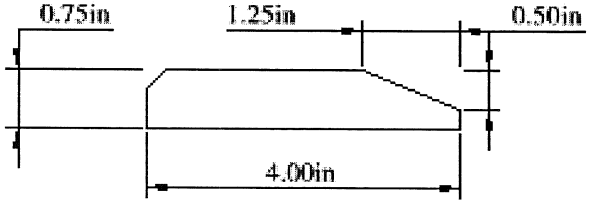
2. Module Size: 2 by 4 inches
3. Thickness: 5/16 inch.
4. Finish: Unglazed Matte.
5. Tile Color: As selected by Architect from manufacturer's full range from Price Groups 1 and 2.
6. Grout Color: As selected by Architect from manufacturer's full range.
7. Mounting: Factory, back mounted.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

   a. Base for Portland Cement Mortar Installations: Coved, module size 2 by 2 inches
   b. External Corners for Portland Cement Mortar Installations: Bullnose shape with radius of at least 3/4 inch unless otherwise indicated.
   c. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.



a. Single Hollywood Bevel 4" Threshold

B. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.

1. Description: Uniform, fine- to medium-grained white stone without veining.

2.4 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

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

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. TEC; a subsidiary of H. B. Fuller Company.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

A. Polymer-Modified Tile Grout: ANSI A118.7.

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

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. TEC; a subsidiary of H. B. Fuller Company.

2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

2.6 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 7 Section "Joint Sealants."

1. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile

work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Floor Tile: 1/8 inch

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Comply with TCNA indications for type of installation and comply with their written recommendations for expansion joints for wall and floor applications. Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.5 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F113: Thin Set ANSI A137.1 and ANSI A108.5.

   a. Tile Type: CT
   b. Thin-Set Mortar: Latex-portland cement mortar.
   c. Grout: Polymer-modified sanded grout.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL 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. Section includes acoustical panels and exposed suspension systems for acoustical ceilings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

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

1. Suspended ceiling components.
2. Structural members to which suspension systems will be attached.
3. Size and location of initial access modules for acoustical panels.
4. Items penetrating finished ceiling including, but not limited to, the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.

5. Perimeter moldings.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

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

1.7 MAINTENANCE MATERIAL SUBMITTALS

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

1. Acoustical Ceiling: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

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

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 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

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. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

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. 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.

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

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS TYPE (ACT1)

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc. Industries Fine Fissured No.1729

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type III, mineral base with painted finish.
2. Color: White.
3. LR: .84.
4. NRC: Not less than .55.
5. CAC: Not less than 35.
6. Edge Detail: Square.
7. Thickness: 5/8 inch.
8. Modular Size: 24 by 48 inches.

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

D. Suspension System Type: As specified in Part 2.6.B.

2.4 Tile Type Three (ACT2) (Grid only)

A. Manufactures:

1. Armstrong World Industries

B. Refer to section 2.5.A, Non-Fire Resistance

2.5 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.

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

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

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
4. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.

C. Hanger Rods Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch diameter bolts.

E. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.6 METAL SUSPENSION SYSTEM

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

1. Armstrong World Industries, Inc.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.

1. Structural Classification: Intermediate duty system.
2. End Condition of Cross Runners: butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: aluminum cold-rolled sheet.
5. Cap Finish: Painted white

2.7 METAL EDGE MOLDINGS AND TRIM

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

1. Armstrong World Industries, Inc.

B. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:

1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 for Alloy and Temper 6063-T5.
2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils . Comply with ASTM C 635 and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

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: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

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. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, counters playing, or other equally effective means.
3. 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.
4. 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.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are

secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

6. 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.
7. 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.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. 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. 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.

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

F. 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. Arrange directionally patterned acoustical panels as follows:

    a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. 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.

5. 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.
6. Install hold-down clips for all vestibule applications and in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 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.

END OF SECTION 095113

SECTION 096513 - 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.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

D. Product Schedule: For resilient base and accessory products.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive resilient products during the following time periods:

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

B. After installation and 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. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL BASE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Johnsonite; A Tarkett Company.

B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).

1. Group: I solid, homogeneous
2. Style and Location:

a. Style B, Cove: Provide in areas with resilient flooring

C. Minimum Thickness: 0.125 inch

D. Height: 4 inches for casework and 6 inches for all other wall applications.

E. Lengths: Coils in manufacturer's standard lengths.

F. Outside Corners: Job formed

G. Inside Corners: Job formed

H. Colors and Patterns: 281 Grizzly.

2.2 VINYL MOLDING ACCESSORY

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Johnsonite

B. Profile and Dimensions: As indicated on the drawings

C. Locations: Provide vinyl molding accessories in areas indicated

D. Colors and Patterns: 281 Grizzly

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 resilient-product manufacturer for applications indicated.

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

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.

1. 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.

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

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

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

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

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 practical 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: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

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

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

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting 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 horizontal surfaces thoroughly.
3. Damp-mop horizontal 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 subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

1. Show details of special patterns.

C. Samples for Initial Selection: For each type of floor tile indicated.

D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

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

1.6 MAINTENANCE MATERIAL SUBMITTALS

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 Tile: Furnish one box for every 60 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

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

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

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive floor tile during the following time periods:

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

B. After installation and 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 tile installation.

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

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, 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.

2.2 VINYL COMPOSITION FLOOR TILE (VCT)

A. Products: Subject to compliance with requirements, provide the following:

1. Armstrong World Industries, Inc.

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

C. Wearing Surface: Smooth

D. Thickness: 0.125 inch

E. Size: 12 by 12 inches

F. Colors and Patterns: 51839 Fortress White.

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 floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile 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.

1. 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 tile.

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

3.2 PREPARATION

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

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 floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to 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 according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

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

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

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

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 in pattern indicated

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.

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 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 protecting floor tile.

B. Perform the following operations immediately after completing floor tile 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 floor tile 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, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.

F. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient floor tile surfaces before applying liquid cleaners, sealers, and finish products.

1. Finish: Apply 3 coats of liquid floor polish.

G. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 099123 – PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will supply a color selection.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork.
b. Acoustical wall panels.
c. Metal toilet enclosures.
d. Metal lockers.
e. Unit kitchens.
f. Elevator entrance doors and frames.
g. Elevator equipment.
h. Light fixtures.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Utility tunnels.
e. Pipe spaces.
f. Duct shafts.

g. Elevator shafts.

3. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper and copper alloys.
e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 2 Section "Cement Concrete Pavement" for traffic-marking paint.
3. Division 5 Section "Structural Steel" for shop priming structural steel.
4. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
5. Division 6 Section "Architectural Woodwork" for shop priming interior architectural woodwork.
6. Division 8 Section "Steel Doors and Frames" for factory priming steel doors and frames.
7. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification. Submit in same format as specification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).

B. Colors: Match Architect's color selections.

C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Submit 4 sets of samples of each final color and finish.

D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to be demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Certifications:
1. Furnish a letter from the paint manufacturer or their factory representative certifying that the paint system proposed for this project are equal to or better than the specified systems in appearance and performance levels. Submit proof of equivalency for approval including generic type, descriptive information, VOC content, performance data, solids by volume, and recommended film thickness. Submittals not accompanied by this certification will be returned, "REJECTED."

QUALITY ASSURANCE

F. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

G. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

H. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.

a. Provide mock up of first and second coats of block filler or primer for approval of application.

b. Wall Surfaces: Provide samples on at least 100 sq. ft.
c. Small Areas and Items: Architect will designate items or areas required.

I. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface. Where materials are being applied over previously painted surfaces, apply mock up samples and perform field testing to check for compatibility, adhesion, and film integrity of the new materials to existing painted surfaces. Report in writing any condition that may affect application, appearance, or performance of the specified coating system.

a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.

2. Final approval of colors will be from benchmark samples.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

C. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.7 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver left-over paint materials to Owner.

1. Quantity: Furnish Owner with extra paint materials in quantities indicated below:

a. Exterior: 2 gallons of each color applied.
b. Interior: 1 case of each color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, provide products from one of the following manufacturers. Sherwin-Williams is the basis of design and establishes the standard of quality required.

B. Manufacturers' Names:

1. Sherwin Williams. (SW)

2. Duron

3. MAB

4. Glidden

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience. Each system should be from the same manufacturer.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Match Architect's samples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

C. Where materials are being applied over previously painted surfaces, apply mock up samples and perform field testing to check for compatibility, adhesion, and film integrity of the new materials to existing painted surfaces. Report in writing any condition that may affect application, appearance, or performance of the specified coating system.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. All surfaces must be clean, dry, and free of all oil, grease, surface contaminants, and substances that could impair adhesion.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
   c. If transparent finish is required, backprime with spar varnish.
   d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
   e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

   a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 10/NACE No. 2.
   b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

6. Interior Grilles, Louvers and Sprinkler Escutcheons shall be painted in the field to match adjacent material color. Contractor shall prep and prime factory finished items to receive new paint finish in the field.

7. Existing Glazed Tile: Clean surfaces to remove all dirt, grease, cleaning agents and contaminants. Apply a test sample over tile and grout using Multi-Purpose Interior/Exterior Latex Primer/Sealer. Allow to dry and perform an adhesion test per ASTM D3359. Provide a report with the results. If adhesion is not

satisfactory, clean and abrade the surface and apply a sample and perform an adhesion test per ASTM D3359. Provide a report with the results.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Exposed uninsulated metal piping.
2. Exposed uninsulated plastic piping.
3. Exposed pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
2. Panelboards.

3. Electrical equipment that is indicated to have a factory-primed finish for field painting.

H. All interior and exterior exposed gypsum wallboard, including any bulkheads and soffits to be painted.

I. All interior and exterior ferrous metal to be painted including any lintels, railings, grilles, and louvers (does not include factory or pre-finished items).

J. All hollow metal doors and frames, interior and exterior, to be painted.

K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

L. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

M. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

N. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

O. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:

a. Quantitative material analysis.
b. Abrasion resistance.
c. Apparent reflectivity.
d. Flexibility.
e. Washability.
f. Absorption.
g. Accelerated weathering.

h. Dry opacity.
i. Accelerated yellowness.
j. Recoating.
k. Skinning.
l. Color retention.
m. Alkali and mildew resistance.

3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

B. Pre-installation Meetings:

1. Schedule a conference and inspection to be held on-site before field application of coating systems begins.
2. Conference shall be attended by Contractor, Owner's representative, Engineer, Construction Manager, coating applicators, and a representative of coating material manufacturer.
3. Topics to be discussed at meeting shall include:

   a. A review of Contract Documents and accepted shop drawings shall be made and deviations or differences shall be resolved.
   b. Review items such as environmental conditions, surface conditions, surface preparation, application procedures, and protection following application.
   c. Establish which areas on-site will be available for use as storage areas and working area

4. Pre-construction conference and inspection shall serve to clarify Contract Documents, application requirements and what work should be completed before coating application can begin.
5. Prepare and submit, to parties in attendance, a written report of pre-installation conference report shall be submitted with 3 days following conference.
6. Field Samples:

   a. Provide a full coating system to the required sheen, color, texture, and recommended coverage rates. Simulate finished lighting conditions for reviewing in-place work.

7. The Architect, Construction Manager or Owners Representative will select one room, area, or combination of areas and surfaces and conditions for each type of coating and substrate to be coated. Apply coatings in this room, area, combination of areas and surfaces according to the schedule, or as specified. After finishes are accepted, this room, area or combination of areas and surfaces will serve as the standard of quality and for evaluation of coating systems of similar nature.
8. A manufacturer's representative shall be available upon request by the General Contractor or Painting subcontractor, to advise applicator on proper application technique and procedures.

3.5 CLEANING

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

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE

A. Previously Painted Ferrous Metal: Provide the following finish systems over exterior previously painted ferrous metal. Primer is not required on shop-primed items. *Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.

1. Semi-Gloss Acrylic-Enamel Finish: two finish coats over an adhesion promoting primer.

a. Spot Primer (for bare or rusted areas): Pro Industrial Pro-Cryl Universal Metal Primer, B66-310 series
b. Primer: Multi-Purpose Interior/Exterior Latex Primer/Sealer, B51-450 series
c. 1st Coat: Pro Industrial High Performance Acrylic Semi-Gloss, B66-650 series
d. 2nd Coat: Pro Industrial High Performance Acrylic Semi-Gloss, B66-650 series

3.8 INTERIOR PAINT SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces at ceiling applications:

1. Flat Acrylic Finish: - Two finish coats over a primer.

a. Primer: ProMar 200 Zero VOC Latex Primer, B28W600.
b. 1st Coat: ProMar 200 Zero VOC Latex Flat, B30W2650 series
c. 2nd Coat: ProMar 200 Zero VOC Latex Flat, B30W2650 series

2. Low Luster Acrylic-Enamel Finish: two finish coats over a primer.

   a. Primer: ProMar 200 Zero VOC Latex Primer, B28W600.
   b. 1st Coat: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series
   c. 2nd Coat: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series

B. Previously Painted Gypsum Board: Provide the following finish systems over previously painted interior gypsum board surfaces. *Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.

1. Low Luster Acrylic-Enamel Finish: two finish coats over an adhesion promoting primer.

   a. Primer: Multi-Purpose Interior/Exterior Latex Primer/Sealer, B51-450 series
   b. 1st Coat: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series
   c. 2nd Coat: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series

C. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semi-Gloss Finish: two finish coats over a primer.

   a. Primer: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310 series
   b. 1st Coat: Pro Industrial High Performance Acrylic Semi-Gloss, B66-650 series
   c. 2nd Coat: Pro Industrial High Performance Acrylic Semi-Gloss, B66-650 series

D. Previously Painted Ferrous Metal: Provide the following finish systems over previously painted ferrous metal. *Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.

1. Semi-Gloss Finish: two finish coats over an adhesion promoting primer.

   a. Spot Primer (for bare or rusty areas): Pro Industrial Pro-Cryl Universal Metal Primer, B66-310 series

   b. Primer: Multi-Purpose Interior/Exterior Latex Primer/Sealer, B51W450.
   c. 1st Coat: Pro Industrial High Performance Acrylic Semi-Gloss, B66-650 series
   d. 2nd Coat: Pro Industrial High Performance Acrylic Semi-Gloss, B66-650 series

E. Concrete Masonry Units: Provide the following finish systems over primer for wall applications.

1. Semi-Gloss Finish: two finish coats over a primer.

   a. Filler: PrepRite Block Filler, B25W25.
   b. 1st Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series
   c. 2nd Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series

F. Previously Painted Concrete Masonry Units: Provide the following finish systems over an adhesion promoting primer for wall applications. *Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.

1. Semi-Gloss Finish: two finish coats over a primer.

a. Primer: Multi-Purpose Interior/Exterior Latex Primer/Sealer, B51W450
b. 1st Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series
c. 2nd Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series

G. Concrete Masonry Units Epoxy Finish for Bathtub Walls: Provide the following epoxy finish systems over filler for Shower Wall applications.

1. Semi-Gloss Epoxy Finish for Immersion: two finish coats over a block filler.

a. Filler: Cement-Plex 875, B42W200.
b. 1st Coat: Macropoxy 646-100 Fast Cure Epoxy Semi-Gloss, B58-620 series
c. 2nd Coat: Macropoxy 646-100 Fast Cure Epoxy Semi-Gloss, B58-620 series

H. Concrete Decking: Provide the following finish systems over existing concrete deck ceiling applications.

1. Eg-Shel Finish: two finish coats applied directly to bare concrete.

a. 1st Coat: Pro Industrial Multi-Surface Acrylic Eg-Shel, B66-560 series
b. 2nd Coat: Pro Industrial Multi-Surface Acrylic Eg-Shel, B66-560 series

END OF SECTION 099123

SECTION 101100 - VISUAL DISPLAY UNITS – GC ALTERNATE-1

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Porcelain enamel markerboards with aluminum frames.
2. Vinyl and fabric-faced cork tackboards with aluminum frames.

1.3 SUBMITTALS

A. Product Data: For each type of visual display board indicated.

B. Shop Drawings: For each type of visual display board required.

1. Include dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length.
2. Include sections of typical trim members.
3. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
4. Contractor shall verify the existing board dimensions to ensure new visual display boards cover extent of existing boards.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and textures available for the following:

1. Markerboards: Actual sections of porcelain enamel finish for each type of markerboard required.
2. Vinyl-Faced Cork Tackboards: Fabric swatches for each type of vinyl- faced cork tackboard indicated. Provide a minimum of 25 color selections for vinyl faced tackboard.
3. Tackstrips/Display Rails: Provide a minimum of (12) cork color selections.

D. Product Certificates: Signed by manufacturers of tackboards certifying that vinyl-faced materials furnished comply with requirements specified for flame-spread ratings.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is an authorized representative of markerboard manufacturer for both installation and maintenance of the type of sliding markerboard units required for this Project.

B. Source Limitations: Obtain visual display boards through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of visual display boards and are based on the products indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Fire-Test-Response Characteristics: Provide vinyl-fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify vinyl-fabric-faced tackboards with appropriate markings of applicable testing and inspecting agency.

1. Flame Spread: 25 or less.
2. Smoke Developed: 10 or less.

E. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.5 WARRANTY

A. Special Warranties:

1. Writing Surface: Manufacturer's standard, written, material warranty agreeing at manufacturer's option to repair or replace the original boards if they do not retain their original writing and erasing qualities, gloss variance, or color consistency under normal usage and maintenance, without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Warranty does not include the cost of removal or reinstallation.

a. Term of Warranty: As long as the product is installed and in use, or Forever, whichever comes first.

2. Workmanship and Materials: Manufacturer's standard, written, material replacement warranty agreeing at manufacturer's option to repair or replace any products which, under normal usage and maintenance, show defects in workmanship or materials, without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Warranty does not include the cost of removal or reinstallation.

   a. Term of Warranty: 10 years from date of Substantial Completion.

PART 2 - PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Porcelain Enamel Markerboards: ALL MUST PROVIDE E-3 Surface.

   a. Marsh Industries
   b. Claridge Products and Equipment, Inc.
   c. School Specialty "BestRite"
   d. AARCO.

2. Tackboards:

   a. Marsh Industries
   b. Claridge Products and Equipment, Inc.
   c. School Specialty "BestRite"
   d. AARCO.

2.2 MATERIALS FOR MARKER BOARD PANELS

A. Writing Surface Facing Sheet

1. Shall be enameling grade cold rolled steel manufactured from a minimum of 30 percent post-consumer and post-industrial waste, .016" thick for all pre-framed boards without joints. All face sheets shall be .025" thick for boards with spline joints and have the same content as .016" thick face sheets.
2. All enameling grade steel shall be coated with the Cradle to Cradle certified e^3 *environmental ceramicsteel*™ coating process developed by PolyVision or equal. Writing surfaces shall exhibit the following characteristics:

   a. All coatings shall contain less than a combined total of less than 0.1 percent of heavy metals cadmium, mercury, hexavalent chromium, and lead.
   b. All coatings shall be free of arsenic and antimony as well as volatile organic compounds.
   c. Writing surface face sheet shall be 99 percent recyclable.
   d. Marker boards shall have a 91 to 97 percent gloss (high gloss surface) and be free of orange peel.

e. Marker board 80 to 85 percent gloss (low gloss surface, recommended for projection. Wet cleaning required if used as a marker surface.)
f. Facing sheet coatings:

1. 1.7-2.5 mils enameled ground coat on face minimum thickness.
2. 3.0 – 4.0 mils enameled cover (color) coat for marker board.
3. 1.7-2.5 mils enameled minimum ground coat on back of facing.
4. Firing temperatures shall be 1475-1500 degrees minimum for marker boards, and 1200-1250 degree for chalk boards.

g. Color(s): As selected by the Architect from the manufacturer's range of standard colors.

B. Writing Surface Core

1. Core: minimum 7/16 inch thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.
2. Backing Sheet: manufacturer's standard. Moisture blocking backing 015 thick recyclable, and shall be factory laminated to core material.
3. Laminating Adhesive: Manufacturer's standard, moisture-resistant, thermoplastic-type adhesive.

C. Lamination

1. Factory machine type only.

2.3 MATERIALS FOR TACKBOARD PANELS

A. Core: Composed of 100 percent post-consumer and post-industrial waste or 100 percent naturally sustainable. Core: 1/4-inch fiberboard laminated to 1/4-inch natural cork.

B. Coverings:

1. 100 percent naturally sustainable

a. 1/4-inch thick pure grain natural cork at all tackstrips and display rails.

2. Covering: 20 ounce per linear yard, 2-ply, 100 percent recycled polyester with a plain weave pattern. Mildew-resistant, washable vinyl fabric complying with FS CCC-W-408, Type II, weighing not less than 13 oz./sq. yd, laminated to 1/4-inch thick cork sheet.

a. Color(s): As selected by the Architect from the manufacturer's range of standard colors. Provide a minimum of 25 color selections at all tackboards.

2.4 ACCESSORIES

A. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062-inch thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Keep joints to a minimum. Miter

corners to a neat, hairline closure. Provide frames equal to Polyvision Series 500 for aluminum frames, factory applied frames.

1. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
2. Field-Applied Trim: Manufacturer's standard snap-on trim with no visible screws or exposed joints.
3. Map Rail: Furnish map rail at top of each markerboard and chalkboard with rail length equaling length of markerboard or chalkboard. In instances where tackboard(s) are located adjacent to markerboard display rail should equal length of markerboard and tackboard(s). Each display rail on markerboard should be complete with the following accessories:

    a. Display Rail: Provide continuous cork display rail approximately 2 inches wide integral with map rail.
    b. End Stops: Provide one end stop at each end of map rail.
    c. Map Hooks: Provide 2 metal map hooks for every 48 inches of map rail or fraction thereof.
    d. Flag Holder: Provide one flag holder for each room.
    e. Metal roller brackets: Provide one pair for each room.

2.5 FABRICATION

A. Porcelain Enamel Markerboards: Laminate facing sheet and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.

B. Assembly: Provide factory-assembled markerboard and tackboard units, unless field assembled units are required.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
2. Provide manufacturer's standard mullion trim at joints between markerboard and tackboards.

2.6 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

PART 3 - PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.

1. Surfaces to receive markerboards shall be free of dirt, scaling paint, and projections or depressions that would affect smooth, finished surfaces of markerboards.
2. Surfaces to receive tackboards shall be dry and free of substances that would impair the bond between tackboards and substrate.
3. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Deliver factory-built visual display boards completely assembled in one piece without joints, where possible. If dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.

B. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

C. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

3.3 ADJUSTING AND CLEANING

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

B. Clean units according to manufacturer's written instructions.

END OF SECTION 101100

SECTION 101423 – PANEL SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following types of signs:

1. Panel signs.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Temporary Facilities & Controls" for temporary project identification signs.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

C. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.

1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
3. Furnish full-size rubbings for metal plaques.

D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

1. Samples for initial selection of color, pattern, and texture:

a. Cast Acrylic Sheet: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.

1.4 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.5 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Manufacturers of Panel Signs:

a. 4Sign Solutions
b. Best Manufacturing
c. Bayuk Graphics

2.2 FRAMED PANEL SIGNS

A. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F, and of the following general types:

1. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.

B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

C. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are non-fading for the application intended.

D. Framed Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally. Frame to match background of panel sign. Minimum of 25 color selections. Color selections to match the existing panel signs.
2. Panel signs shall be as indicated with 1" high room numbers and ¾" high room identification. Standard grade Braille shall be ½" below copy. All signage shall comply with ADA guidelines.
3. Edge Condition: Square
4. Edge Color: Same as background.
5. Frame: To Match 3X1-401 Black
6. Background: To Match 3X1-504 Air Force Blue
7. Letters: To Match 3X1-204 Bright White
8. Corner Condition: Square Corners
9. Frame Material: Plastic
10. Sizes: Refer to Drawings
11. Refer to drawings for quantities and locations for Sign Type 1A and 4B.
12. NOTE: FINAL TEXT FOR ALL SIGNS TO BE APPROVED BY OWNER PRIOR TO MANUFACTURING.

10. Note: Where panel signs are to be installed on glass side-lights, provide and install a matching 'blank' framed panel sign to the opposite side of the glass to conceal the double sided tape.

E. Laminated Sign Panels: Permanently laminate face panels to backing sheets of material and thickness indicated using the manufacturer's standard process.

F. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

1. All panel signs shall comply in all regards with ADA requirements, including raised copy and braille message.
2. Signs indicating entrances to men's and women's toilet rooms shall include the manufacturer's standard symbol for men and women.
3. Provide signs at the entrances to all toilet rooms that are not accessible directing people needing handicapped accessible facilities to the closest accessible toilet facilities.

G. Engraved Copy: Machine-engrave letters, numbers, symbols, and other graphic devices into sign panel on the face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates in a pantographic system or equivalent process capable of producing characters of the style indicated with sharply formed edges.

2.3 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Wall-Mounted Framed Panel Signs: All signs shall be mounted per ADA guidelines. Attach panel signs to wall surfaces using the methods indicated below:

1. Vinyl-Tape Mounting: Use double-sided foam tape with silicone added to back of frame to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

3.2 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 101423

SECTION 102123 - CUBICLE TRACKS AND CURTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Cubicle curtain tracks and carriers.
2. Cubicle curtains.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data including durability, fade resistance, and fire-test-response characteristics for each type of curtain fabric specified.

C. Shop Drawings showing layout and types of cubicles, size of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.

D. Coordination Drawings for reflected ceiling plans drawn accurately to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension assembly members.
2. Method of attaching cubicle curtain track hangers to building structure.
3. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.

E. Samples for initial selection in the form of manufacturer's color charts for each type of curtain fabric indicated.

1. Curtain Fabric: 12-inch- square swatch from dye lot used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material.
2. Mesh Fabric: Manufacturer's standard-size unit, not less than 4 inches square.

G. Schedule of cubicles using same room designations indicated on Drawings.

H. Product certificates signed by manufacturers of cubicle tracks and curtains certifying that their products comply with specified requirements.

I. Maintenance data for cubicle tracks and curtains to include in the operation and maintenance manual specified in Division 1.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements. Verify that tracks and curtains may be installed to comply with the original design and referenced standard.

B. Space Enclosure and Environmental Limitations: Do not install tracks and curtains until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, and work above ceilings is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements of the Instructions to Bidders, manufacturers offering products that may be incorporated into the Work include, but are not limited, the following:

1. Maharam Fabrics (Basis of Design)
2. ADC Hospital Equipment
3. General Cubicle Co.
4. Nelson, A.R. Nelson Co., Inc.

2.2 CUBICLE TRACK

A. Track: Anodized, extruded aluminum.

1. Curved Track: Factory fabricated, not less than 12-inch- radius bends.
2. Splicing Clamp: Of same material and finish as track.

B. Track Mounting: Ceiling mounted; mechanically fastened to suspended ceiling grid.

1. Concealed Fasteners: Stainless steel.

C. Track Accessories: Provide end caps, connectors, end stops, coupling sleeves, wall brackets, and other accessories as required for secure and operational installation. Provide a quantity of carriers for 6-inch spacing the full length of the curtain plus 1 additional carrier.

1. Carriers: Nylon rollers and axle with chrome-plated steel hook.

2.3 CUBICLE CURTAINS

A. Fabric: Provide cubicle curtain fabrics with the following characteristics:

1. Fabrics are launderable to a temperature of not less than 160 deg F.
2. Fabrics are flame resistant and are identical to those that have passed NFPA 701 when tested by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify fabrics with appropriate markings of applicable testing and inspecting agency.

B. Curtain Top: Not less than 20-inch-wide nylon mesh with 1/2-inch- holes. Overlap seams and double-lock stitch to body of curtain.

C. Provide curtains fabricated to comply with the following requirements:

1. Width: Equal to track length from which curtain is hung plus 10 percent, but not less than 12 inches.
2. Length: Equal to floor-to-ceiling height minus 18 inches from finished ceiling at top and 12 inches above finished floor.
3. Top Hem: Not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double stitched.

    a. Grommets: 2-piece, rolled-edge, rustproof, nickel-plated brass and spaced not more than 6 inches o.c.

4. Bottom and Side Hems: Not less than 1 inch wide, reinforced, triple thickness, and single stitched.
5. Seams: Not less than 1/2 inch wide, double turned and double stitched.

D. Curtain Drop: PVC strip with chrome-plated steel hook.

E. Curtain Tieback: At each termination.

F. Operating Wand: Fiberglass baton, not less than 30 inches long.

G. Cubicle Curtain Fabrics: Provide Maharam, Pattern: Bouyant 511280, Color: 001 Honey.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine ceilings for suitable conditions where cubicle track is to be installed.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install cubicle curtain track level and plumb, according to manufacturer's written instructions and original design.

B. Install ceiling-mounted tracks at intervals of not less than 24 inches. Coordinate track installation with ceiling grid and lighting fixtures.

C. Install suspension-mounted tracks at intervals of not more than 48 inches. Secure ends of track to wall with flanged fittings. Fasten at each splice and the tangent point of each corner.

D. Center fastener in track to insure unencumbered carrier operation.

3.3 PROTECTION

A. Protect installed track opening with a non-residue adhesive tape to prevent debris from the ceiling finishing operation from impeding carrier operation.

END OF SECTION 102123

SECTION 105050 - METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wardrobe lockers. Type 1 – 12wx12dx36h – Double Tier

2. Refer to the Locker Types/Elevations as indicated on the construction document drawings.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of locker and bench.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

1. Show locker fillers, trim, base, sloping tops, and accessories. Include locker-numbering sequence.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

D. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain locker units and accessories through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver lockers until spaces to receive them are clean, dry, and ready for locker installation.

B. Protect lockers from damage during delivery, handling, storage, and installation.

C. Deliver master keys, control keys, and combination control charts to Owner.

1.6 ACCESSIBILITY

A. A minimum of 5% of the lockers shall be accessible (as required to comply with ADA). This applies to both the wardrobe lockers and athletic lockers; refer to the plans for locations. The detailed descriptions of each locker type below are for standard, non-accessible, lockers. The accessible lockers shall be modified to be fully ADA compliant (including, but not necessarily limited to: the locks [type and mounting height], shelves, hooks).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Republic Storage Systems Co., Inc.
2. Penco Products, Inc.; Subsidiary of Vesper Corporation.
3. Lyon Metal Products, Inc.
4. DeBourgh Manufacturing Co.

B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Metal Locker Schedule at the end of Part 3.

2.2 MATERIALS

A. Steel Sheet: ASTM A 366/A 366M, matte finish, suitable for exposed applications, and stretcher leveled or roller leveled to stretcher-leveled flatness.

B. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

C. Equipment - Manufacturer's standard plated steel hooks/coat rods.

2.3 WARDROBE LOCKERS

A. Body: Form backs, tops, bottoms, sides, and intermediate partitions from steel sheet; flanged for double thickness at back vertical corners. Comply with the following:

1. Back-Material Sheet Thickness: 0.0239 inch (0.60 mm).
2. Side-Material Sheet Thickness: 0.0239 inch (0.60 mm).
3. Exposed Ends: Form exposed ends of non-recessed lockers from minimum 0.0598-inch- (1.50-mm-) thick steel sheet.

B. Frames: Form channel frames from minimum 0.0598-inch- (1.50-mm-) thick steel sheet; lapped and welded at corners. Form continuous integral door strike on vertical frame members. Provide resilient bumpers to cushion door closing.

1. Latch Hooks: Form from minimum 0.1046-inch- (2.70-mm-) thick steel; welded or riveted to door frames.
2. Cross Frames: Form intermediate channel cross frames between tiers from minimum 0.0598-inch- (1.50-mm-) thick steel sheet. Weld to vertical frame members.

C. Doors: One-piece steel sheet, formed into channel shape at vertical edges and flanged at right angles at top and bottom edges. Fabricate to prevent springing when opening or closing, and to swing 180 degrees. Comply with the following:

1. Sheet Thickness: 0.0747 inch (1.90 mm) minimum.
2. Reinforcing and Sound-Dampening Panels: Brace or reinforce inner face of doors with manufacturer's standard reinforcing angles, channels, or stiffener panels.
3. Acoustical Treatment: Fabricate lockers for quiet operation with manufacturer's standard rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact.

    a. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen door surface and reduce sound levels when door is slammed, of die-formed metal with full perimeter flange and sound-dampening material. Spot weld panel to inside of door.

4. Concealed Ventilation: Provide slotted perforations in top and bottom flange of door. Door fronts shall be flush.

D. Shelves: Provide hat shelf in single-tier units; fabricated from minimum 0.0239-inch- (0.60-mm-) thick, formed steel sheet; flanged on all edges.

E. Hinges: Steel, full loop, five or seven knuckle; tight pin; minimum 2 inches (51 mm) high. Weld to inside of door frame and attach to door with at least two factory-installed fasteners that are completely concealed and tamper resistant when door is closed.

1. Provide at least three hinges for each door more than 42 inches (1067 mm) high and at least two hinges for each door 42 inches (1067 mm) high or less.

F. Continuous Hinges: Manufacturer's standard, steel continuous hinge mounted to door and frame.

G. Recessed Handle and Latch: Manufacturer's standard housing, formed from 0.0359-inch- (0.90-mm-) thick nickel-plated steel or stainless steel, with integral door pull, recessed for latch lifter and locking devices; non-protruding latch lifter; and automatic, pre-locking, pry-resistant latch, as follows:

1. Provide minimum three-point latching for each door more than 42 inches (1067 mm) high; minimum two-point latching for each door 42 inches (1067 mm) high or less.

a. Provide strike and eye for padlock.

2.4 LOCKER ACCESSORIES

A. Interior Equipment: Furnish each locker with the following items, unless otherwise indicated:

1. Hooks: Manufacturer's standard zinc-plated, ball-pointed steel. Provide one double-prong ceiling hook, and not fewer than two single-prong wall hooks for single and double triple-tier units. Attach hooks with at least two fasteners.

B. Number Plates: Manufacturer's standard etched, embossed, or stamped, aluminum number plates with numerals at least 3/8 inch (9 mm) high. Number lockers in sequence indicated. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

C. Continuously Sloping Tops: Manufacturer's standard, fabricated from minimum 0.0359-inch- (0.90-mm-) thick steel sheet, for installation over lockers with separate flat tops. Fabricate tops in lengths as long as practicable, without visible fasteners at splice locations, finished to match lockers. Provide fasteners, filler plates, supports, and closures, as follows:

1. Closures: Vertical-end type.
2. Sloped top corner fillers, mitered.

D. Recess Trim: Manufacturer's standard; fabricated from minimum 0.0478-inch- (1.20-mm-) thick steel sheet, minimum 2-1/2-inch (64-mm) face width, and finished to match lockers. Fabricate trim in lengths as long as practicable.

E. Filler Panels: Manufacturer's standard; fabricated from minimum 0.0478-inch- (1.20-mm-) thick steel sheet in an unequal leg angle shape, and finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

F. Boxed End Panels: Manufacturer's standard; fabricated from minimum 0.0598-inch- (1.50-mm-) thick steel sheet, with 1-inch- (25-mm-) wide edge dimension, finished to match lockers, and designed for concealing exposed ends of non-recessed lockers.

G. Finished End Panels: Manufacturer's standard; fabricated from minimum 0.0239-inch- (0.60-mm-) thick steel sheet, finished to match lockers, and designed for concealing exposed ends of non-recessed lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

H. Center Dividers: Manufacturer's standard; fabricated from minimum 0.0239-inch-(0.60-mm-) thick steel sheet, full-depth, vertical partitions between bottom and shelf, and finished to match lockers.

2.5 FABRICATION

A. Unit Principle: Fabricate each locker with an individual door and frame, individual top, bottom, back, and shelves, and common intermediate uprights separating compartments.

B. All-Welded Construction: Preassemble lockers by welding all joints, seams, and connections, with no bolts, screws, or rivets used in assembly. Grind exposed welds flush.

C. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, one-piece assembly.

1. Form locker-body panels, doors, shelves and accessories from one-piece steel sheet, unless otherwise indicated.

2.6 FINISHES, GENERAL

A. Finish all steel surfaces and accessories, except prefinished stainless-steel and chrome-plated surfaces.

B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.

B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-enamel finish consisting of a thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.4 mils (0.036 mm) on doors, frames, and legs, and 1.1 mils (0.028 mm) elsewhere.

1. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

2.8 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-enamel finish consisting of a thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.4 mils (0.036 mm) on doors, frames, and legs, and 1.1 mils (0.028 mm) elsewhere.

1. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss. (Three color choices Std).

C. Galvanized steel as described above shall be used for all athletic lockers.

2.9 LOCKER BASES

A. All corridor lockers shall be set on a 4-inch high heavy duty manufacturer provided metal base unless noted and detailed otherwise on the construction documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine concrete bases for suitable conditions where metal lockers are to be installed.

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

3.2 INSTALLATION

A. Install metal lockers and accessories level, plumb, rigid, and flush according to manufacturer's written instructions.

B. Assemble knocked-down lockers with standard fasteners, with no exposed fasteners on door faces and face frames.

C. Connect groups of all-welded lockers together with standard fasteners, with no exposed fasteners on face frames.

D. Anchor lockers to floors and walls at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Install anchors through backup reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.

E. Fit exposed connections of trim, fillers, infill panels and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed lockers with concealed clips.
2. Attach sloping top units to lockers, with closures at exposed ends.

F. Attach boxed end panels with concealed fasteners to conceal exposed ends of nonrecessed lockers.

G. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed lockers.

H. Anchor locker benches to floors Uniformly space pedestals not more than 72 inches (1830 mm) apart, and securely fasten to bench top and anchor to floor.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

B. Clean interior and exposed exterior surfaces and polish stainless-steel and nonferrous-metal surfaces.

C. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit locker use during construction.

D. Touch up marred finishes, or replace locker units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

3.4 METAL LOCKER TYPES

A. Metal Wardrobe Lockers **(Type 1)**: Where metal lockers of this designation are indicated, provide products complying with the following:

1. Product: Provide one of the following:

    a. Republic
    b. Penco – Guardian, or approved equal
    c. Lyon Metal
    d. Debough Manufacturing

2. Material: Steel sheet
3. Back-Material Thickness: 18 gauge
4. Side-Material Thickness: 16 gauge
5. Door-Material Thickness: 16 gauge
6. Locker Fabrication: All welded.
7. Locker Arrangement: Refer to plans.
8. Backs: Solid
9. Sides: Solid
10. Door Style: Flush with concealed vents
11. Shelves: Solid
12. Hinges: Standard hinge
13. Handles/Latches: Recessed
14. Locks: Strike and eye for padlock; lock by owner.
15. Accessories:

    a. Sloping Tops: Continuous; refer to plans for recessed locations.
    b. Recess Trim: As required
    c. End Panel: Finished
16. Color[s]: As selected by Architect from manufacturer's full range.

END OF SECTION 105050

SECTION 122413 - ROLLER WINDOW SHADES

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. Manually operated roller shades to be applied to W2 windows in the following rooms: 107 and 108 mounted at the new vertical mullions at ceiling height per Detail 8/A1.3.

B. Related Requirements:

1. Division 6 Section "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
2. Division 7 Section "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples: For each exposed product and for each color and texture specified, 10 inches long.

D. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

E. Roller-Shade Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material, signed by product manufacturer.

C. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than 2 units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following and not limited to:

1. Draper Inc. Manual Flexshade
2. Hunter Douglas Contract. (Equal to Draper)
3. MechoShade Systems, Inc. (Equal to Draper)
4. Jackson's Window Shoppe

B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard.

a. Loop Length: Full length of roller shade.
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Chain tensioner, jamb mounted

B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of inside face of shade
2. Direction of Shadeband Roll: Regular, from back of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

E. Shadebands:

1. Shadeband Material: Light-filtering Series
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Enclosed in sealed pocket of shadeband material

b. Color and Finish: As selected by Architect from manufacturer's full range

F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

a. Shape: L-shaped
b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 3 inches.

2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than 3 inches

3. Endcap Covers: To cover exposed endcaps.
4. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701 Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: SheerWeave 2300
2. Type: Vinyl Coated polyester
3. Weight: 13.9 oz per yard.
4. Openness Factor: 3 percent.
5. Color: As selected by Architect from manufacturer's full range.

2.4 ROLLER-SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F.

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inchLength equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch plus or minus 1/8 inch.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4 provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance of the Work.

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

3.2 ROLLER-SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

SECTION 123216 – EDUCATIONAL CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

0.2 SUMMARY

A. Provide all plastic laminate casework and related accessory items as specified herein. Refer to contract documents for specific details and requirements. Casework includes all storage components, accessory items, closure, fillers, and framing necessary for a complete installation, as identified by manufacturers product/model number, or reference thereto.

B. Provide coordination with Mechanical and Electrical contractors for their respective installation of mechanical and electrical fixtures.

0.3 RELATED WORK

A. General millwork and custom cabinetry unless specified herein or so noted on plans as included within this section.

B. Rubber, vinyl or other finished toe base.

C. Blocking within walls.

D. Sinks, faucets, fittings, traps, stops, tail pieces, vacuum breakers, and other fixtures, electrical and mechanical runs and connections.

E. Fixture installation/services connections: Setting and installation of equipment and fixtures, and related utility connections, are provided under the other sections of the Project Specification governing the utility.

0.4 SUBMITTALS

A. Submit shop drawings for approval in the form of one, reproducible sepia and one print. Show materials, dimensions, cabinet-cut details, and sink locations.

B. Samples of colors shall be submitted upon award of contract for selection and coordination with other suppliers. Architect to have color choice from full range of laminates from laminate manufacturer. Architect may request and retain samples and catalog cuts as required for accessory and special items.

0.5 QUALIFICATIONS

A. LSI Corporation is used to establish a standard of quality. Subject to compliance with requirements, products that may be incorporated into the work include:

1. LSI Corporation of America, Inc.
2. Case System
3. Mastercraft
4. Polyvision
5. Stevens
6. TMI
7. Wood Metal Industries

B. Casework must conform to design, quality of materials, design intent, workmanship and exact performance function of casework components and details specified and implied by manufacturer's reference, and as shown on plans regardless of that manufacturer's "product standards"

C. Manufacturers requesting approval shall submit evidence of at least 5 years experience and installations for similar type of project. Manufacturers shall also show evidence of financial stability, plant facilities, catalogs, and specifications. Full-sized samples, catalogs, and specifications shall be submitted with written request along with detailed list of compliance and deviations from these documents for approval. Samples may be impounded by Owner and retained until completion of job for verification and compliance with specifications

D. In addition to the above requirements, manufacturers requesting approval shall, at the same time, submit certified product test data in accordance with ANSI A161.1-1980, NEMA LD3-1991, and general static load testing performed and certified by an independent testing agency, covering the following areas of product performance, with these minimum results.

1.	Base cabinet construction/racking test:	800 lbs.
2.	Cabinet front joint loading test:	425 lbs.
3.	Wall cabinet static load test:	2,200 lbs.
4.	Drawer front joint loading test:	600 lbs.
5.	Drawer construction/static load test:	635 lbs.
6.	Cabinet adjustable shelf support device/static load test:	300 lbs.
7.	Particleboard screw holding power:	350 lbs.

E. The following performance details are project requirements and must be met by all Bidders. Deviations will not be allowed.

1. Design

   a. Casework: LSI Corporation Style L-44, used to establish a standard of quality. Overlay door design with door/drawer front edge having 3mm PVC and cabinet body edge having FlatEdge PVC.

2. ADA-Americans with Disabilities Act Requirements: The special requirements specified herein shall be met, where specifically indicated on architectural plans

as "ADA", or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations.

3. Lamination System: Doors, finished end panels, and other decorative exterior laminate surfaces shall be composed of minimum 3/4 inch core, laminated exterior with .030 inch high pressure plastic laminate, and interior with .020 inch high pressure cabinet liner. Lamination with hybrid P.V.A. Type III water resistant adhesives. Total thickness 13/16 inch. No exceptions.
4. Structural Cabinet Body: Cabinet backs shall be minimum 3/8 inch thick, inset from rear of body, fully housed four sides, and back-shimmed. Provide 3/4 inch thick stiffeners glued and fastened to back/body as specified herein. Back perimeter and stiffeners to be fully sealed with hot melt adhesive.
5. Interior Space: All cabinets shall have clear span interiors. No vertical dividers allowed unless by specified architectural design.
6. Heavy Components: Wall cabinet tops and bottoms, and all bookstack shelves shall be minimum 1 inch thick, for additional load support. Shelves in door cabinets 30 inches wide and over shall be 1 inch thick. Shelves in open cabinets, regardless of width, shall be 1 inch thick.
7. Structural Drawer Body: Drawer body material shall be multi-directional fiberboard with bottom recessed, captured all four sides and sealed with hot melt adhesive. Provide under body stiffener as specified herein. Particleboard bodies and/or surface-applied bottoms are not acceptable.
8. Drawer Suspension: Drawer slides shall be self-closing design, epoxy power-coated, with positive instop, outstop, and out-keeper. Kynamic (operational) load rating to be minimum 100 lbs. Minimum 150 lb. static load rating.
9. Structural Cabinet Support: Cabinet sub base shall be of a separate and continuous ladder-type platform design leveled and floor mounted prior to cabinet body replacement. Material to be exterior grade plywood. No cabinet sides-to-floor will be allowed.

F. Architect/Owner's opinion and decision shall be final in the evaluation of manufacturer's products for approval to bid or award of contract.

G. Guarantee: All materials produced by the Casework Manufacturer shall be guaranteed for a period of five years from manufacturer's defects and workmanship. Other materials and equipment shall carry the Guarantee of the product manufacturer.

PART 1 - PRODUCTS

1.1 MATERIALS -

A. Laminated Plastics/Finishes

1. High pressure plastic laminate, .030 inch thickness, for exterior cabinet surfaces shall meet NEMA LD3-1991 GP28 standards including thickness.
2. Exterior Color Selection Available:

    a. Standard finish vertical surface laminate from full range of 125 laminate manufacturer's colors consisting of wood grain patterns and solid colors.
    b. Total of 6 different colors available per project.

c. Manufacturers: Laminates shall be selected from a combination of the following laminate manufactures.

1. Wilsonart.
2. Pionite.

3. Plastic Laminate Balancing Sheet: White high pressure cabinet liner, .020 inch thickness shall meet NEMA LD3-1991 CL 20 standards. Use for balancing exterior surface laminates.
4. Countertop High Pressure Plastic Laminate:

a. High pressure plastic laminate, textured finish .050 inch thickness or .042 inch postforming grade as detailed. Color as selected from manufacturer's full range of laminate patterns and colors.
b. Heavy gauge neutral colored backing sheet for balanced construction.

5. Pressure Fused Laminate/Interior Surfacing:

a. Melamine resin impregnated, 100 gram PSM minimum, surface laminated to core under pressure.
b. Shall meet NEMA LD3.1-1991 GP28 standards and NEMA LD3-1991 CL20 standards.
c. White pressure fused laminate for cabinet interiors behind doors, drawers and underside of wall cabinets. Provide HPL for all interiors of open cabinets.
d. Shall be balanced at all concealed surfaces with phenolic backer. Unsurfaced coreboard not allowed.

B. High Performance Particle Board Core:

1. Particleboard to be 47 lb. density, of balanced 3-ply construction with moisture content not to exceed 8%. Particleboard shall conform to ANSI A208-1-1993, Type M-3.
2. Particleboard cabinet components to be of the following minimum core thickness prior to lamination:

a. 3/8" cabinet backs
b. 1/2": dividers, as detailed
c. 3/4": base and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, door, drawer head, cabinet back rear hangstrips, dividers as detailed, exposed cabinet backs.
d. 1": wall cabinet tops and bottoms, door-cabinet shelving 30 inch width and over, exposed cabinet shelving and off-wall shelving of all widths.

C. Edging types: Provide one or more of the following in accordance with Paragraph 2.1.D, "Edging Locations":

1. 3mm thick PVC. Solid, high impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, automatically trimmed, inside/outside length-radiused for uniform appearance, buffed and corner-radiused for consistent design.
2. Flat Edge PVC, .020 inch. Solid, high impact, purified, color-thru, acid resistant

PVC edging machine-applied with hot melt adhesives, automatically trimmed face, back, and corners for uniform appearance. Manufacturer option of .030 inches high-pressure plastic laminate if PVC is unavailable.

D. Edging Locations

1. Edging locations on all Casework: provide edging types at the following locations:

   d. Door/Drawer-Front edging shall be 3 mm PVC.
   e. Cabinet Body edge, including door/drawer front spacer rail shall be flat edge PVC, color matched to door/drawer face.
   c. Interior body component edging, interior dividers, drawer body, shelf shall be FlatEdge PVC to match cabinet interior surface color, white.

E. Hardware:

1. Hinges

   a. Heavy duty, five knuckle 2 3/4 inch institutional type hinge shall meet ANSI/BHMA A156.9 Grade 1 requirements. Mill ground, hospital tip, tight pin feature with all edges eased. Hinge to be full wrap around type of tempered steel .095 inch thick. Each hinge to have minimum 9 screws, #7, 5/8 inch FHMS to assure positive door attachment.
   b. One pair per door to 48 inch height. One and one-half pair over 48 inch in height. Hinge to accommodate 13/16 inch thick laminated door and allow 270 degree swing.
   c. Finish to be LH-301 ChromeCoat Powder Finish or painted finish.

2. Pulls

   a. Wire design, LH-325 nylon, 4 inch, in Chrome.

3. Drawer Slides

   a. Standard Drawers: LSI Lab Series Slide, LH-376, self-closing design. White epoxy powder coated with positive in-stop, out-stop, and out-keeper to maintain drawer in 80% open position. Captive nylon rollers, front and rear. Minimum 100 lb. dynamic load rating at 50,000 cycles. Minimum 150 lb. static load rating.
   b. Paper Storage Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb., zinc plated or epoxy coated at manufacturer's option
   c. Student Island Assembly Drawers, Full extension, 3-part progressive opening slide, minimum 100 lb. Zinc plated or epoxy coated at manufacturer's option
   d. File Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb. zinc plated or epoxy coated at manufacturer's option.
   e. Provide body mounted molded rails for hanging file system for legal or letter size as indicated by manufacturer's model number

4. Catches: Catch to provide opening resistance in compliance with the Americans with Disabilities Act.

a. Provide one top-mounted magnetic catch for base, wall and tall cabinet door. Catch housing to be molded in White. LH-340ADA.
b. LH-345 Roller catch for mobile cabinets.

5. Adjustable Shelf Supports: To be LH-354 twin pin design with anti tip-up shelf restraints for both 3/4 inch and 1 inch shelves. Design to include keel to retard shelf slide-off, and slot for ability to mechanically attach shelf to clip. Load rating to be minimum 300 lbs. each support without failure, reference 1.4.D. Cabinet interior sides shall be flush, without shelf system permanent projection.

6. Wardrobe Rod: To be 1 1/16 inch rod, LH-362, supported by LH-363 flanges. Rod shall be mounted 48" A.F.F

7. Locks: To be disc tumbler lock keyed alike per room and master keyed. Dull chrome finish.

   a. Hinged doors and drawers National Lock No. M4-7054.

8. Coat Hooks:

   a. Double Coat Hooks, ceiling mount - Satin Aluminum
   b. Single Coat Hooks, ceiling mount - Satin Aluminum
   c. Double Coat hooks, wall mount - Satin Aluminum
   d. Single Coat Hooks, wall mount - Satin Aluminum
   e. Hooks shall be mounted 48" A.F.F

9. Wheel Casters

   a. Casters for low mobile units to be LH-390 4 inch x 1 1/16". Minimum 275 lb. Load rating per caster. Wheel brakes on front two casters.
   b. LH-386 swivel casters for standard mobile cabinets shall be plate type caster with ball bearing swivel. Size shall be 5 inches for tall mobiles, with 1 1/16 inch wide tread for carpet or hard cover floor. Wheel brakes on front two casters. Minimum 300 lb. load rating per caster.

10. Molded Personal pencil Drawer: high Impact, Medical Grade Polystyrene, FDA approved, with in-stop, out-stop, and self closing features. Compartmented drawer body molded in Black with Black epoxy coated metal slides. Provide where indicated by product designation on plans or as scheduled.

11. Cable Trays: Unless otherwise specified, cable trays shall be 6 inches high x 4 inches deep returned vertically 3 inches. Cable trays shall be of 16 gauge steel with hemmed return, or high impact Styrene with reinforced exist-ends, Black. When so designated by architectural detail, or product number designation, cable trays shall include integral seven plug grounded duplex electrical strip with surge protector, and 6 foot three wire cord/socket.

1.2 CONSTRUCTION

A. Detailed Requirements for Cabinet Construction

1. Sub-Base:

    a. Cabinet Sub-Base: To be separated and continuous (no cabinet body sides-to-floor), water resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type construction of front, back and intermediates to form a secure and level platform to which cabinets attached.
    b. Tubular steel 1 1/4" square base in brushed chrome, or black, furnished where specified.

2. Cabinet Top and Bottom:

    a. Solid sub-top to be furnished for all base and tall cabinets.
    b. Wall cabinet and library stack bottoms and tops to be 1 inch thick.
    c. Exterior exposed wall cabinet bottoms to be Pressure Fused White laminate both sides. Assembly devices to be concealed on bottom side of wall cabinets.

3. Cabinet Ends

    a. Holes drilled for adjustable shelves 1 1/4 inch on center.
    b. Exposed exterior cabinet ends to be laminated with high pressure plastic laminate, balanced with high pressure cabinet liner interior surface.
    c. Front edges shall be flush with door/drawer face.

4. Fixed and Adjustable Shelves

    a. Thickness: Behind doors, to be 3/4 inch to 27 inches wide. One inch shelving at 30 inch wide cabinet and over.
    b. Thickness at all widths of open cabinets to be 1 inch.

5. Cabinet Backs:

    a. Cabinet back to be fully housed into sides, top, and bottom, recessed 7/8 inch from cabinet rear. Rear, unexposed, side of back to receive continuous bead of hot melt adhesive at joint between back and sides/top/bottom.
    b. Hang rails shall be glued to rear of cabinet back and mechanically fastened to cabinet sides. Provide minimum of 2 at base, 2 at wall, and 3 at tall cabinets.
    c. Exposed exterior backs to be high pressure plastic laminate balanced with high pressure cabinet liner.

6. Door and Drawer Fronts

    a. Laminated door and drawer fronts to be 13/16 inch thick for all hinged and sliding doors. Drawer fronts and hinged doors are to overlay the cabinet body. Maintain a maximum 1/8 inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
    b. Stile and Rail doors shall be 13/16 inch thick glazed with full ¼ inch glass.

Available hinged or sliding. All exposed lite-opening edges shall be trimmed and glazed with extruded vinyl glazing bead.

7. Drawers

   a. Drawer fronts shall be applied to separate drawer body component sub-front.
   b. Drawer sides shall be dadoed and glued to receive front and back, machine squared and held under pressure while hot melt glued and pinned together.
   c. Drawer bottom to be housed into front, sides and back. Underside of drawer to receive continuous bead of hot melt adhesive at joint between bottom and back/sides/front for sealing and rigidity. Reinforce drawer bottoms with 1/2 inch by 4 inch front-to-back intermediate underbelly stiffeners, hot melt glued and fastened. One at 24 inch, two at 36 inch, four at 48 inch.
   d. Paper storage drawers fitted with full width hood at back.
   e. All drawers shall have roller guides as specified under Paragraph 2.1.E.3.

8. Vertical and Horizontal Dividers: One of the following as indicated by cabinet number:

   a. Natural hardboard 1/4 inch thick, smooth both faces. Secured in cabinet with molded plastic clips.
   b. Pressure Fused laminate 3/4 inch thickness. Secured in cabinet with molded plastic clips or dowels.

9. Door/Drawer Front Rail: Provide minimum 3/4 inch x 6 inch x full width cabinet body rails immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, close off reveal, and be locator for lock strikes.

10. ADA-Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:

    a. Countertop height: with or without cabinet below, not to exceed a height of 34 inches A.F.F., (Above Finished Floor), at a surface depth of 24 inches.
    b. Kneecap clearance: to be minimum 27 inches A.F.F., and 30 inches clear span width.
    c. 12 inch deep shelving, adjustable or fixed: not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F.
    d. Wardrobe cabinets: to be furnished with rod/shelf adjustable to 48 inches A.F.F. at a maximum 21 inch shelf depth.
    e. Sink cabinet clearances: in addition to 10.a,b. above, upper kneecap frontal depth to be no less than 8 inches, and lower toe frontal depth to be no less than 11 inches, at a point 9 inches A.F.F., and as further described in Volume 56, Section 4.1.9.

B. Countertops

1. General: High pressure plastic laminate bonded to particleboard core. Thickness as shown on plans. Underside to be properly balanced with heavy gauge backing sheet. Provide tops in as long as practical continuous lengths. Provide field glued spleens at joints. No joints closer than 24 inches either side of sink cutout.

PART 2 - EXECUTION

2.1 COORDINATION

A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items.

B. Verify site dimensions of cabinet locations in building prior to fabrication.

2.2 INSTALLATION

A. Storage and Protection: Casework shall be protected in transit. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.

B. Workmen: Install casework under the supervision of the manufacturer's representative with factory-trained mechanics certified by manufacturer.

C. Workmanship

1. Erect casework straight, level and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, ducts, etc.
2. Install all items complete and adjust all moving parts to operate properly.
3. Leave surface clean and free from defects at time of final acceptance.

D. Guarantee: All materials shall be guaranteed for a period of 5 years from manufacturer's defects and workmanship.

E. Clean Up: Remove all cartons, debris, sawdust, scraps, etc., and leave spaces clean and all casework ready for Owner's use.

END OF SECTION 123216